COLLECTIVE INTELLIGENCE:

Creating a Prosperous World at Peace

Foreword by Yochai Benkler
(Re-mixed by Hassan Masum)
The Wealth of Networks: Remixed Highlights

Prefaces by
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The Internet and the Revitalization of Democracies

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Dedication

To Tom Atlee and George Pór,
without whose efforts
this book would not have been possible.

To Doug Engelbart and Stewart Brand,
for pointing the way.

To Alvin & Heidi Toffler, for their sustained
ethical and intellectual leadership.

Fast Path to Individual Authors

Each page number denotes the start of a distinct contribution.

Publisher's Preface

Robert Steele

Open Source Intelligence (OSINT) is converging with Collective or Co-Intelligence, Peace Intelligence, and Commercial Intelligence.[1] This book signals, but does not itself represent, the emergence of the discipline of Collective Intelligence. This book is the first of three books—each an edited work bringing together best in class authors—being published in 2008, with another three under consideration for 2009. In order to show my intentions as the publisher, I list the titles below as a form of overview.

2008

COLLECTIVE INTELLIGENCE: Creating a Prosperous World at Peace

PEACE INTELLIGENCE: Assuring a Good Life for All

COMMERCIAL INTELLIGENCE: From Moral Green to Golden Peace

2009 (Subject to Redirection)

GIFT INTELLIGENCE: Optimizing & Orchestrating Global Charity

CULTURAL INTELLIGENCE: Faith, Ideology, & the Five Minds

GLOBAL INTELLIGENCE: EarthGame™ for All

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[1] One reason we are discarding OSINT as a term is because of its largely deliberate subordination to a support role for secret sources and methods. In the USA, the recent issuance of disappointingly incomplete and misleading Congressional Research Service (CRS) report, and my own personal substantive rebuttal as communicated to each Senator and Representative, are the final nail in OSINT's coffin. Public Intelligence, in many flavors, is how we will eradicate the threats to Humanity and save our Earth. Both documents are online at http://www.oss.net/HILL, at the end of that page.

Each of these books will be printed in limited editions for sale via Amazon, while also being offered free online, with each chapter having all active links stabilized within a PDF file. In 2008, I will also publish my own new work, *WAR & PEACE: The Seventh Generation*, which will outline a plan for all of us to wage peace henceforth. It too will be free online.

Right up front I want to honor Mark Tovey, as well as make mention of several Canadians who have played an important role in nurturing my individual efforts.

I met Mark Tovey through a brilliant poster that he had composed, and which was put on display at Wikimania 2006. I obtained the file and replicated the poster for my office, where it has been a daily inspiration.

It was not until recently, when I was obliged to cancel a conference on Multinational Decision Support (it was a year too soon for those new to the world of Public Intelligence) that money was freed up to do three books. I started by getting in touch with Tom Atlee, founder of the Co-Intelligence Institute and author of the *Tao of Democracy: Using Co-Intelligence to Create a World that Works for All*. Tom had created an informal network of individuals, including Mark. With his encouragement, I was able to attract a sufficient number of authoritative and relevant chapters to know that the book was viable.

This is when Mark came in, after I invited him to consider being the editor in order to ensure the book met academic as well as professional standards. I must affirm in the strongest possible terms the extraordinary contributions Mark has made as the editor. The structuring of the book is his, as well as the recruitment of a number of additional contributors I would simply not have been able to identify or engage. This book is a magnificent manifestation of the deep personal understanding, diligence, and good intention of Mark Tovey.

As the book took new shape under Mark Tovey's leadership, Hassan Masum joined us in two special capacities: first, in contributing and obtaining permission to include the remixed Foreword that respects the extraordinary intellectual contribution of Yochai Benkler to the emerging discipline, and secondly, in doing indices for chapters whose authors were unavailable. Marc Stamos helped us in obtaining permission for, and indexing, the Afterword.

Several other Canadians have helped nurture the emerging and overarching discipline of Public Intelligence. Brigadier General James Cox, then the Deputy N-2 for Supreme Headquarters Allied Powers Europe (SHAPE), invited me to brief the 70-odd military intelligence chiefs for the North Atlantic Treaty Organization (NATO), the Partnership for Peace (PfP), and the Mediterranean Dialog nations. While I made no impression at all on most of them (but am pleased to see so many OSINT centers in Eastern Europe today), he and the N-2 Actual were sufficiently engaged to task the intelligence unit at Supreme Allied Command, Atlantic, where another Canadian, then Lieutenant Commander Andrew Chester personally organized and guided the *NATO Open Source Intelligence Handbook*, the *NATO Open Source Intelligence Reader*, and *Intelligence Exploitation of the Internet*.

Chief Warrant Officer Rick Gill, Canadian Army, was an early enthusiast, and my understanding is that Canada has a worthwhile defense OSINT capability because he threw himself into the task. Similarly, within the Royal Canadian Mounted Police (RCMP), Ms. L. Schnittker worked very hard with minimal resources, to create a law enforcement application of this discipline.

The Honorable Louise Frechette, then Deputy Secretary General of the United Nations (UN), formerly Deputy Minister of Defense, has never met me and probably does not know I exist, but her attempts to establish a proper process of decision support in the UN were reported to me, and in combination with the interest of MajGen Patrick Cammaert, RN NL (Retired), then on his way to be the Military Advisor to the Secretary General, I published the book, the first of its kind, on *PEACEKEEPING INTELLIGENCE: Emerging Concepts for the Future*. The UN is long overdue for an Assistant Secretary General for Decision Support as well as a diplomatic Office for Information Sharing Treaties and Agreements and a Multinational Decision Support Center (MDSC). The US has offered informally to fund all three.

With this book I end my almost twenty-year long effort to help governments get a grip on the 94% of the information they do not have to steal,[2] and turn my attention to creating the World Brain as an EarthGame™ in

[2] These five links are the essence of the past that will now power the future: www.oss.net/BASIC, www.oss.net/LIBRARY, www.oss.net/OSINT-S, www.oss.net/OSINT-O, www.oss.net/CCC, Also Transitioner Global Challenges Wiki.

which every person is afforded access to all information in all languages all the time, and democracy is not just revitalized, but transformed. The Earth Intelligence Network, a non-profit with 501c3 status from 12 January 2007, will seek to facilitate and nurture all collective public efforts to create co-intelligence, collective intelligence, and "smart" organizations at every level.

My intention is to create an open, legal, ethical process by which the United Nations and non-governmental organizations such as Doctors without Borders, the International Committee of the Red Cross, and Foundations responsible for charitable giving, can receive multinational decision-support helpful to their decisions about their respective strategic mandates, operational campaign plans, tactical interventions, and technical choices. War as we know it between nations is over. The Chinese have focused on electronic war more deeply than we have, and in bringing Dick Cheney's aircraft down over Singapore, have demonstrated they can neutralize any weapons or mobility system. There will still be armed conflicts, but at the national level, we have no alternative but to get serious about waging peace.[3]

My path has been an unusual one, but I now see my 30 years of government service in the secret world as a necessary preamble to ensuring that public intelligence in the public interest becomes a reality. There is plenty of money to restore and preserve Earth while affording every person on the planet a life of dignity, justice, liberty, and prosperity. Where we have gone wrong is in allowing governments to misrepresent us, while also allowing corporations to bribe key government officials so as to loot the commonwealths of our own Republic as well as the lesser developed nations.[4] I believe that within three to five years the public will be able to put a stop to secret earmarks in government budgets and bribes in corporate budgets, at the same time that "true cost" information on every product and service becomes available to the consumer at the point of sale, via cell phone photo of the barcode, and ScanBack to the

[3] In 2007 the US Government, acting "in our name" authorized, appropriated, and obligated $30 billion for diplomacy and $975 billion more or less, for war. This is lunacy. For what we have spent on the Iraq war, we could have given every one of the billion extreme poor a free cell phone for life, and instantly helped them connect and create additional wealth—when you make $1 a day, getting to $3 a day is a really big deal, with hundreds of billions left over for clean water, food, and shelter.

[4] See the Failed States Index for additional information.

World Index of Social and Environmental Responsibility (WISER). Using localized credit cards, such as are offered by the Interra Project, entire communities can shut out those entities that persist in externalizing the true cost of their offerings.

At root, such a revolution in the group mind of the human collective is the only means by which we can create infinite stabilizing wealth that enables the assurance of a good life for all. Corruption, crime, and corporate misbehavior can be reduced through the non-violent acquisition and sharing of legal, ethical, open information that is discriminated, distilled, and disseminated on a "just enough, just in time, just right basis." *Connecting the poor with cell phones will have a huge impact*.

Below is a technical diagram to put collective intelligence in context.

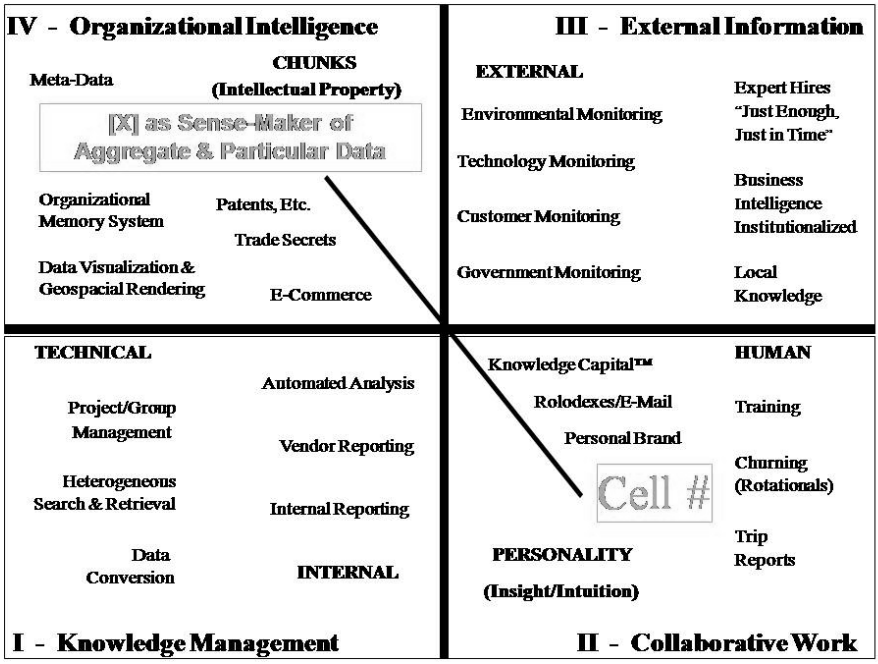


Figure 1: Four Quadrants of Evolutionary Intelligence

I put the above diagram together in the early 1990's as I struggled with the contradiction between how much money the US Government was spending on information technology across all agencies, and on stealing information within the secret world, in both cases, having little to show and no sense-making.

Business Intelligence is generally used as a term for internal data mining viewed through a digital dashboard and is firmly entrenched in Quadrant I. Competitive Intelligence, as represented by the members of the Society of Competitive Intelligence Professionals (SCIP), focuses primarily on the market space and competitors in that market space, rather than on the needs of existing and unknown customers, and the realities of the external world. This group is based in Quadrant II with a narrow focus within Quadrant III. OSS.Net, now a subsidiary of a much larger company, has been in this quadrant for fifteen years. Using a global network of road-runners, retired attaches, graduate students, and locationally well-positioned observers, we have been able to tap into all information in all languages all the time.

Neither of these two is the equal of Commercial Intelligence, which fully integrates customers, externalities, exactly the right combination of experts on demand, the right automated sense-making tools, and the customized decision-support, getting the right information to the right person at the right time.

It is in Quadrant IV where I believe we can simultaneously achieve Harold L. Wilensky's vision for *Organizational Intelligence* (1967) and the complementary visions of each of the authors represented in this book.

It is my hope that this three book series will lead to what the Swedes call M4IS: Multinational, Multiagency, Multidisciplinary, Multidomain Information Sharing, and that the emergent collective intelligence community will move toward Quadrant IV at the same time that we bring as many of the five billion poor as possible into Quadrant II. In 2009, we will publish edited works focused on the harmonization of charitable giving and on a multi-cultural raproachment at all levels in all languages.

I envision 100 million volunteers, among them covering all 183 languages with full access to the Internet and using Skype, able to educate the five billion poor "one cell call at a time."

I envision a United Nations Assistant Secretary General for Decision Support, using a Multinational Decision Support Center funded by the US Government, able to issue an annual strategic plan useful to all of the Foundations, Non-Governmental Organizations (NGO)s, governments, and corporations considering their own autonomous mix of charitable giving and direct foreign assistance.

I envision a Multinational Peace Corps built around the new U.S. Army Civil Affairs Brigade, whose Colonel Commanding, Ferd Irizarry, is the Hal Moore of our generation. He gets it. He understands that a small unit can sweep through an area, handing out cell phones and calling in targets for precision assistance, e.g. an "in and out" helicopter-delivered well-digging team.

I envision the EarthGame™ being used, along with WISER, to connect individual donors with individuals in need all over the world, allowing for precision micro-giving.

As context, I wish to share the poem that brought me to the side of the angels in the early 1980's:

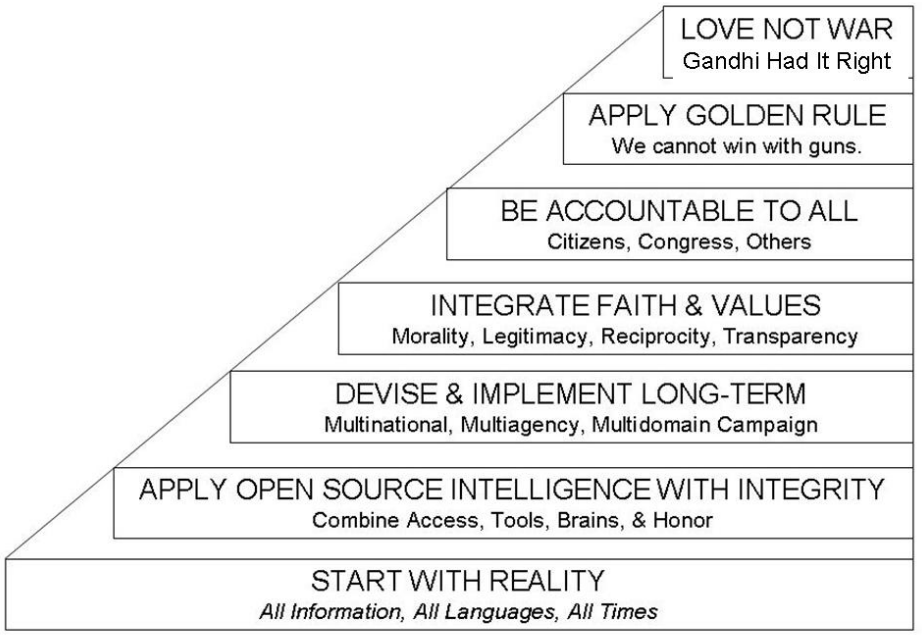
PEACE

Our words go slowly out
and the sun burns
them before they
can speak. It is
as though the earth
were tired of our talk
and wanted peace, an end
to promises, perhaps an
end to us.

Philip Levine, *7 Years from Somewhere: Poems* (Athenium, 1979)

I have three sons, 18, 15, and 12. I want all of us to come together to give our children, and the next seven generations, the gift of a prosperous world at peace. All of our institutions are broken—it is now up to us as a collective.

Below is the strategic vision with integrated values that the twenty-four co-founders of the Earth Intelligence Network have adopted.



In my own two contributions to this book, and at two websites, www.oss.net, and www.earth-intelligence.net, can be found twenty years of original thinking by over 750 well-intentioned minds. With this book, we begin the process of embracing the distributed intelligence of the Whole Earth while empowering indigenous peoples everywhere.

We are all committed to full-time faith in man and God, real-time science, and decision-support for all, thus creating peace & prosperity.

I salute the editor, Mark Tovey; Hassan Masum and Marc Stamos, each of the contributors; and you, the reader, to whom I offer this collection as a token of what is possible if we create a *World Brain* as H. G. Wells proposed in his 1930's book by that title. ***St.***

The Wealth of Networks: Highlights Remixed

Yochai Benkler[1]
(Remixed[2] by Hassan Masum[3])

Yochai Benkler's *The Wealth of Networks: How Social Production Transforms Markets and Freedom* (Yale University Press, 2006) is an extended philosophical manifesto on the potential of open source decentralized "peer production"—not just as a way of creating software, but in the broader sense of a fundamentally new means of producing goods, services, and freedom itself.

For all of us, there comes a time on any given day, week, and month, every year and in different degrees over our lifetimes, when we choose to act in some way that is oriented toward fulfilling our social and psychological needs, not

[1] Yochai Benkler is the Berkman Professor of Entrepreneurial Legal Studies at Harvard, and faculty co-director of the Berkman Center for Internet and Society. Before joining the faculty at Harvard Law School, he was Joseph M. Field '55 Professor of Law at Yale. He writes about the Internet and the emergence of networked economy and society, as well as the organization of infrastructure, such as wireless communications. www.benkler.org

[2] Since the online version of the book is available at author Yochai Benkler's site under a Creative Commons Attribution - Non-Commercial - ShareAlike license, Hassan Masum remixed several of his favorite parts of the book into an essay, which hopefully conveys some of the essence of Benkler's subtle and insightful work. This remix originally appeared on July 14TH, 2006 on Worldchanging.com and is reprinted here by kind permission of Benkler and Masum. This remix was originally made available under a Creative Commons Attribution-Noncommercial-ShareAlike license.

[3] After postdoctoral research and stints with government, engineering firms, and the National Research Council of Canada, Hassan Masum is now Senior Research Co-ordinator with the *McLaughlin-Rotman Center for Global Health* in Toronto and a contributor to WorldChanging.com. www.hmasum.com.

our market-exchangeable needs. It is that part of our lives and our motivational structure that social production taps, and on which it thrives.

There is nothing mysterious about this. It is evident to any of us who rush home to our family or to a restaurant or bar with friends at the end of a workday, rather than staying on for another hour of overtime or to increase our billable hours; or at least regret it when we cannot. It is evident to any of us who has ever brought a cup of tea to a sick friend or relative, or received one; to anyone who has lent a hand moving a friend's belongings; played a game; told a joke, or enjoyed one told by a friend.

What needs to be understood now, however, is under what conditions these many and diverse social actions can turn into an important modality of economic production. When can all these acts, distinct from our desire for money and motivated by social and psychological needs, be mobilized, directed, and made effective in ways that we recognize as economically valuable?

In the industrial economy in general, and the industrial information economy as well, most opportunities to make things that were valuable and important to many people were constrained by the physical capital requirements of making them. From the steam engine to the assembly line, from the double-rotary printing press to the communications satellite, the capital constraints on action were such that simply wanting to do something was rarely a sufficient condition to enable one to do it. Financing the necessary physical capital, in turn, oriented the necessarily capital-intensive projects toward a production and organizational strategy that could justify the investments. In market economies, that meant orienting toward market production. In state-run economies, that meant orienting production toward the goals of the state bureaucracy. In either case, the practical individual freedom to cooperate with others in making things of value was limited by the extent of the capital requirements of production.

In the networked information economy, the physical capital required for production is broadly distributed throughout society. The result is that a good deal more that human beings value can now be done by individuals, who interact with each other socially, rather than as market actors through the price system. Sometimes, under conditions I specify in some detail, these nonmarket collaborations can be better at motivating effort and can allow creative people to work on information projects more efficiently than would traditional market mechanisms and corporations.

If there is one lesson we can learn from globalization and the ever-increasing reach of the market, it is that the logic of the market exerts enormous pressure on existing social structures. If we are indeed seeing the emergence of a substantial component of nonmarket production at the very core of our economic engine - the production and exchange of information, and through it of information-based goods, tools, services, and capabilities - then this change suggests a genuine limit on the extent of the market. Such a limit, growing from within the very market that it limits, in its most advanced loci, would represent a genuine shift in direction for what appeared to be the ever-increasing global reach of the market economy and society in the past half-century.

I treat property and markets as just one domain of human action, with affordances and limitations. Their presence enhances freedom along some dimensions, but their institutional requirements can become sources of constraint when they squelch freedom of action in nonmarket contexts. Calibrating the reach of the market, then, becomes central not only to the shape of justice or welfare in a society, but also to freedom.

What we are seeing now is the emergence of more effective collective action practices that are decentralized but do not rely on either the price system or a managerial structure for coordination. This kind of information production by agents operating on a decentralized, nonproprietary model is not completely new. Science is built by many people contributing incrementally—not operating on market signals, not being handed their research marching orders by a boss—independently deciding what to research, bringing their collaboration together, and creating science. What we see in the networked information economy is a dramatic increase in the importance and the centrality of information produced in this way.

No benevolent historical force will inexorably lead this technological-economic moment to develop toward an open, diverse, liberal equilibrium. If the transformation I describe as possible occurs, it will lead to substantial redistribution of power and money from the twentieth-century industrial producers of information, culture, and communications—like Hollywood, the recording industry, and perhaps the broadcasters and some of the telecommunications services giants—to a combination of widely diffuse populations around the globe, and the market actors that will build the tools that make this population better able to produce its own information environment rather than buying it ready-made.

None of the industrial giants of yore are taking this reallocation lying down. The technology will not overcome their resistance through an insurmountable progressive impulse. The reorganization of production and the advances it can bring in freedom and justice will emerge, therefore, only as a result of social and political action aimed at protecting the new social patterns from the incumbents' assaults. It is precisely to develop an understanding of what is at stake and why it is worth fighting for that I write this book.

Imagine three storytelling societies: the Reds, the Blues, and the Greens. Each society follows a set of customs as to how they live and how they tell stories. Among the Reds and the Blues, everyone is busy all day, and no one tells stories except in the evening. In the evening, in both of these societies, everyone gathers in a big tent, and there is one designated storyteller who sits in front of the audience and tells stories. It is not that no one is allowed to tell stories elsewhere. However, in these societies, given the time constraints people face, if anyone were to sit down in the shade in the middle of the day and start to tell a story, no one else would stop to listen.

Among the Reds, the storyteller is a hereditary position, and he or she alone decides which stories to tell. Among the Blues, the storyteller is elected every night by simple majority vote. Every member of the community is eligible to offer him—or herself as that night's storyteller, and every member is eligible to vote.

Among the Greens, people tell stories all day, and everywhere. Everyone tells stories. People stop and listen if they wish, sometimes in small groups of two or three, sometimes in very large groups. Stories in each of these societies play a very important role in understanding and evaluating the world. They are the way people describe the world as they know it. They serve as testing grounds to imagine how the world might be, and as a way to work out what is good and desirable and what is bad and undesirable.

Now consider Ron, Bob, and Gertrude, individual members of the Reds, Blues, and Greens, respectively. Ron's perception of the options open to him and his evaluation of these options are largely controlled by the hereditary storyteller. He can try to contact the storyteller to persuade him to tell different stories, but the storyteller is the figure who determines what stories are told. To the extent that these stories describe the universe of options Ron knows about, the storyteller defines the options Ron has.

Bob's autonomy is constrained not by the storyteller, but by the majority of voters among the Blues. These voters select the storyteller, and the way they choose will affect Bob's access to stories profoundly. If the majority selects only a small group of entertaining, popular, pleasing, or powerful (in some other dimension, like wealth or political power) storytellers, then Bob's perception of the range of options will be only slightly wider than Ron's, if at all. The locus of power to control Bob's sense of what he can and cannot do has shifted. It is not the hereditary storyteller, but rather the majority.

Gertrude is in a very different position. First, she can decide to tell a story whenever she wants to, subject only to whether there is any other Green who wants to listen. She is free to become an active producer except as constrained by the autonomy of other individual Greens. Second, she can select from the stories that any other Green wishes to tell, because she and all those surrounding her can sit in the shade and tell a story. No one person, and no majority, determines for her whether she can or cannot tell a story. No one can unilaterally control whose stories Gertrude can listen to. And no one can determine for her the range and diversity of stories that will be available to her from any other member of the Greens who wishes to tell a story.

How, one might worry, can a system of information production enhance the ability of an individual to author his or her life, if it is impossible to tell whether this or that particular story or piece of information is credible, or whether it is relevant to the individual's particular experience? Will individuals spend all their time sifting through mounds of inane stories and fairy tales, instead of evaluating which life is best for them based on a small and manageable set of credible and relevant stories?

Having too much information with no real way of separating the wheat from the chaff forms what we might call the Babel objection. Individuals must have access to some mechanism that sifts through the universe of information, knowledge, and cultural mores in order to whittle them down to a manageable and usable scope. The question then becomes whether the networked information economy, given the human need for filtration, actually improves the information environment of individuals relative to the industrial information economy.

There are three elements to the answer: First, as a baseline, it is important to recognize the power that inheres in the editorial function. The extent to which information overload inhibits autonomy relative to the autonomy of an

individual exposed to a well-edited information flow depends on how much the editor who whittles down the information flow thereby gains power over the life of the user of the editorial function, and how he or she uses that power. Second, there is the question of whether users can select and change their editor freely, or whether the editorial function is bundled with other communicative functions and sold by service providers among which users have little choice.

Finally, there is the understanding that filtration and accreditation are themselves information goods, like any other, and that they too can be produced on a commons-based, nonmarket model, and therefore without incurring the autonomy deficit that a reintroduction of property to solve the Babel objection would impose. From the discussions of Wikipedia to the moderation and metamoderation scheme of Slashdot, and from the sixty thousand volunteers that make up the Open Directory Project to the PageRank system used by Google, the means of filtering data are being produced within the networked information economy using peer production and the coordinate patterns of nonproprietary production more generally.

Developments in network topology theory and its relationship to the structure of the empirically mapped real Internet offer a map of the networked information environment that is quite different from the naive model of "everyone a pamphleteer." To the limited extent that these findings have been interpreted for political meaning, they have been seen as a disappointment—the real world, as it turns out, does not measure up to anything like that utopia. However, that is the wrong baseline. There never has been a complex, large modern democracy in which everyone could speak and be heard by everyone else. The correct baseline is the one-way structure of the commercial mass media.

The networked information economy makes individuals better able to do things for and by themselves, and makes them less susceptible to manipulation by others than they were in the mass-media culture. In this sense, the emergence of this new set of technical, economic, social, and institutional relations can increase the relative role that each individual is able to play in authoring his or her own life.

Whether their actions are in the domain of political organization (like the organizers of MoveOn.org), or of education and professional attainment (as with the case of Jim Cornish, who decided to create a worldwide center of information on the Vikings from his fifth-grade schoolroom in Gander,

Newfoundland), the networked information environment opens new domains for productive life that simply were not there before. In doing so, it has provided us with new ways to imagine our lives as productive human beings.

How will the emergence of a substantial sector of nonmarket, commons-based production in the information economy affect questions of distribution and human well-being? The pessimistic answer is, very little. Hunger, disease, and deeply rooted racial, ethnic, or class stratification will not be solved by a more decentralized, nonproprietary information production system. Without clean water, basic literacy, moderately well-functioning governments, and universal practical adoption of the commitment to treat all human beings as fundamentally deserving of equal regard, the fancy Internet-based society will have little effect on the billions living in poverty or deprivation, either in the rich world, or, more urgently and deeply, in poor and middle-income economies.

Despite the caution required in overstating the role that the networked information economy can play in solving issues of justice, it is important to recognize that information, knowledge, and culture are core inputs into human welfare. Agricultural knowledge and biological innovation are central to food security. Medical innovation and access to its fruits are central to living a long and healthy life. Literacy and education are central to individual growth, to democratic self-governance, and to economic capabilities. Economic growth itself is critically dependent on innovation and information.

For all these reasons, information policy has become a critical element of development policy and the question of how societies attain and distribute human welfare and well-being. Access to knowledge has become central to human development.

Proprietary rights are designed to elicit signals of people's willingness and ability to pay. In the presence of extreme distribution differences like those that characterize the global economy, the market is a poor measure of comparative welfare. A system that signals what innovations are most desirable and rations access to these innovations based on ability, as well as willingness, to pay, over-represents welfare gains of the wealthy and under-represents welfare gains of the poor. Twenty thousand American teenagers can simply afford, and will be willing to pay, much more for acne medication than the more than a million Africans who die of malaria every year can afford to pay for a vaccine.

The emergence of commons-based techniques—particularly, of an open innovation platform that can incorporate farmers and local agronomists from around the world into the development and feedback process through networked collaboration platforms—promises the most likely avenue to achieve research oriented toward increased food security in the developing world.

It promises a mechanism of development that will not increase the relative weight and control of a small number of commercial firms that specialize in agricultural production. It will instead release the products of innovation into a self-binding commons—one that is institutionally designed to defend itself against appropriation. It promises an iterative collaboration platform that would be able to collect environmental and local feedback in the way that a free software development project collects bug reports—through a continuous process of networked conversation among the user-innovators themselves.

Laboratory funding currently is silo-based. Each lab is usually funded to have all the equipment it needs for run-of-the-mill work, except for very large machines operated on time-share principles. Those machines that are redundantly provisioned in laboratories have downtime. That downtime coupled with a postdoctoral fellow in the lab is an experiment waiting to happen. If a group that is seeking to start a project defines discrete modules of a common experiment, and provides a communications platform to allow people to download project modules, perform them, and upload results, it would be possible to harness the overcapacity that exists in laboratories.

In principle, although this is a harder empirical question, the same could be done for other widely available laboratory materials and even animals for preclinical trials on the model of, "brother, can you spare a mouse?" The undergraduate educational experience could actually contribute to new experiments, as opposed simply to synthesizing outputs that are not really needed by anyone.

In February 2001, the humanitarian organization *Doctors Without Borders* (also known as Medecins Sans Frontieres, or MSF) asked *Yale University*, which held the key South African patent on stavudine—one of the drugs then most commonly used in combination therapies—for permission to use generic versions in a pilot AIDS treatment program. At the time, the licensed version of the drug, sold by Bristol-Myers-Squibb (BMS), cost $1,600 per patient per year. A generic version, manufactured in India, was available for $47 per patient per year.

At that point in history, thirty-nine drug manufacturers were suing the South African government to strike down a law permitting importation of generics in a health crisis, and no drug company had yet made concessions on pricing in developing nations. Within weeks of receiving MSF's request, Yale negotiated with BMS to secure the sale of stavudine for fifty-five dollars a year in South Africa. Yale, the University of California at Berkeley, and other universities have, in the years since, entered into similar *ad hoc* agreements with regard to developing-world applications or distribution of drugs that depend on their patented technologies. These successes provide a template for a much broader realignment of how universities use their patent portfolios to alleviate the problems of access to medicines in developing nations.

A technology transfer officer who has successfully provided a royalty-free license to a nonprofit concerned with developing nations has no obvious metric in which to record and report the magnitude of her success (saving X millions of lives or displacing Y misery), unlike her colleague who can readily report X millions of dollars from a market-oriented license, or even merely Y dozens of patents filed. Universities must consider more explicitly their special role in the global information and knowledge production system. If they recommit to a role focused on serving the improvement of the lot of humanity, rather than maximization of their revenue stream, they should adapt their patenting and licensing practices appropriately.

We also have very clear examples of businesses that have decided to fight the new changes by using every trick in the book, and some, like injecting corrupt files into peer-to-peer networks, that are decidedly not in the book. Law and regulation form one important domain in which these battles over the shape of our emerging information production system are fought. As we observe these battles; as we participate in them as individuals choosing how to behave and what to believe, as citizens, lobbyists, lawyers, or activists; as we act out these legal battles as legislators, judges, or treaty negotiators, it is important that we understand the normative stakes of what we are doing.

We have an opportunity to change the way we create and exchange information, knowledge, and culture. By doing so, we can make the twenty-first century one that offers individuals greater autonomy, political communities greater democracy, and societies greater opportunities for cultural self-reflection and human connection.

We can remove some of the transactional barriers to material opportunity, and improve the state of human development everywhere. Perhaps these changes will be the foundation of a true transformation toward more liberal and egalitarian societies. Perhaps they will merely improve, in well-defined but smaller ways, human life along each of these dimensions. That alone is more than enough to justify an embrace of the networked information economy by anyone who values human welfare, development, and freedom.

Editor's Preface

Mark Tovey

This book is not about collective intelligence as an abstraction, but collective intelligence directed towards a specific end. It attempts to get some traction on difficulties that seem almost impossible to address—dealing with poverty and hunger, corruption and terrorism, climate change and resource shortages—while at the same time building a more livable and less violent world.

The problems that face humanity are trans-institutional. They are not problems that can be solved by governments alone. Only through coordinated cooperation between governments, universities, corporations, and NGOs, can we hope to make a dent in the acute challenges that face us (I-01-02).

This involves bridging diverse viewpoints. When we are dealing with as many points of view as are expressed in such institutions, facilitated discussions can be very helpful. There are specific principles that can help diverse groups of people engage in dialogue with each other in a way that is unencumbered by ego (I-02-01). Indeed, it seems important to have groups that are as diverse as possible, groups where tensions are inevitably going to arise, and where they can be safely examined and understood (I-02-03). Anyone who has spent time observing (or participating in) a flame war on an Internet news group knows that these kinds of principles are just as urgently needed in the electronic sphere. As we attempt to scale up our deliberative discussions through electronic communities (I-04-02), argumentation systems (II-08-03), and social networking (I-04-01), a deep understanding of these principles, and how they can be applied in a variety of domains, will be needed.

To do this, we must ask questions that matter (I-02-02). Questions serve at least two purposes: channeling and encouraging fruitful dialogue (I-02-03), and leading to further inquiry and knowledge generation (I-02-04). Whatever we learn about how to ask the right questions will have great applicability across the board, whether in designing appropriate technology (II-06-03), doing

foresight (I-01-01), or writing group blogs (I-08-03). There are projects now underway to articulate the principles of successful civic interaction (I-03-01).

How can we invite ordinary citizens into the decision-making process in a way that is likely to produce generally accepted results (I-02-05)? Virtual models of a city could significantly engage citizens by allowing them to visualize and plan a better future more easily (I-03-05). How can we winnow suggestions from citizens in a way that will be perceived as fair (II-08-02)? How can we give people the information they need to make critical decisions, when much of it is closed off in information silos (Publisher's Preface, I-03-03)?

If it is important to have not just a few individuals, but all members of a society, capable of thinking carefully about the challenges we face, how do we enable everyone to do so (I-03-04)? Are there ways that we can invite people to think more globally, to take not just their communities, but the whole of humanity, the whole biosphere, into consideration (I-03-02)?

As more and more of the world is enabled to connect, we need tools to analyze how we are connecting (I-04-01) so that we can design electronic communities that encourage thought and substantive discussion (I-04-02), where expertise is readily shared (I-04-03). We need an Internet where individuals will have greater control over how their information is used by companies (I-05-01), which may encourage them to be more open with their information (I-05-02).

How do we think clearly about problem solving (I-06-01)? How do we improve our facility with producing collective intelligence (A, B, I-06-03)? How do we re-think hierarchy (I-06-02) in an increasingly peer-produced world (II-07-02)?

These are not easy questions, but we can draw inspiration from nature (*biomimicry*) (II-01-02), to help design better collectively intelligent systems. If we learn more about how locusts or starlings swarm, we will gain insight into effective systems of collective online production (II-01-01). Our understanding grows when we begin not only to observe cognition in the wild[1], but to model it (II-01-03, II-02-01), and to understand more properly the strengths and

[1] Refers to Hutchins, E. (1995), *Cognition in the Wild*. Cambridge, MA: MIT Press.

limitations of the "Wisdom of Crowds,"[2] and the role played by cognitive bias (II-02-02).

To avoid information-overload, we need to invent systems to structure our information semantically (II-03-01, C), and to roll these systems out onto the Internet (II-03-02). These are the foundations for a sophisticated system of information creation, retrieval (II-04-03), and interaction that one might call a global brain (II-03-03, II-05-01) or World Brain (II-05-01, Earth Intelligence Network).[3]

Whether the development of such a system would lead to a society of richly interconnected individuals (II-04-01), collaborating effectively in high-performance teams (II-04-02), or whether they would result in a society which suppresses individualism (II-02-03), is a question that deserves more than passing attention.

One of the things that can help us maintain our individuality is a powerful set of technologies encouraging communities to design (II-06-03), tinker with (II-06-01), and manufacture (II-06-02), their own stuff: to create their own electrical grids with locally generated electricity (II-07-02), maintain their own broadcast and mesh networks (II-07-03), and produce robust local currencies that can work seamlessly with the global economy (II-05-02). Such activities are also precisely the kinds of de-coupling measures we need to create societies that are resilient against system shocks[4] in an increasingly uncertain world.

We are seeing the development of tools that will enable us to move towards a world that is more fiscally (II-05-01, II-08-02) and environmentally (II-05-03, II-05-04) sound. Indeed, open-source and mass collaborative methodologies (II-08-02) are enabling social entrepreneurs of every stripe (II-08-01) to band together and solve the tough problems the world faces (II-08-04). At a local level, community wireless gets people out into cafés, enabling them to meet

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[2] Refers to Surowiecki, J. (2004). *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations*. New York: Doubleday.

[3] After H.G. Wells (1938) *World Brain*. Admantine Press, reprinted in 1993.

[4] See Homer-Dixon, Thomas. (2004). Speech to the *Navigating a New World Symposium*, Convocation Hall, University of Toronto, November 6, 2004. Some of this speech is available at http://www.homerdixon.com/download/thomashomerdixon2-high.mpeg.

their neighbors (II-07-01); the more they know about their neighborhood, the more likely they are to feel a sense of connectedness and responsibility towards the community they are living in. With luck, these methodologies will help to lay the foundations for effective, transparent, and participatory democracies of the future (Afterword).

However, we are not there yet. Foresight (I-01-01) and scenario planning (II-08-02) can help us see both opportunities and pitfalls in the adoption of new technologies. Looking back from a possible future (I-03-06) is a useful way of imagining not utopian worlds, or dystopian nightmares, but topias[5]: imperfect, but livable, visions of the future—realistic futures we might actually want to live in.

All of these forms of openness can be seen to support and facilitate each other, can be seen as elements of an emerging culture, one that values safe, open, and local participation. It is a culture that invites people to be where they are, and gives them inviting spaces in which to do that. Suffixing "2.0" to institutions, whether the Web, the University, or Democracy, speaks to a culture of engagement, contribution, transparency, and creativity, where reuse of both information and physical objects are part of the culture. Gender, class, background, or ethnicity matter less than what someone contributes. In fact this diversity acts not to divide, but to enrich. These are the kinds of values that will be required for successful trans-institutional cooperation and engagement, which is necessary to deal with the challenges that face us as a species, and to create a more peaceful and prosperous world for everyone.

[5] http://www.topiaenergy.com/ourname.asp

Table of Contents

May the conversations continue…

This book, *Collective Intelligence: Creating a Prosperous World at Peace,* is not only a book; it is also a gathering of the tribes of CI, at least virtually, on the pages of this collection of essays and interviews.

Between the covers of the book, dozens of semantic and computational CI researchers; social activists; process consultants and facilitators; writers and journalists; foresight, educational and security specialists; and virtual community experts, come together to stimulate a global conversation that could take us all to the next level of conscious evolution.

In this volume, organizational professionals; "crowd wisdom" enthusiasts and opponents; search engine experts; political scientists; peer production champions, and many others, find each other and each other's ideas. They are all inspired by the possibility that together we can find more *co-intelligent* solutions to today's challenges than alone.

Thanks to the many contributors, and the good work of the editor and the publisher, the print edition of the book is too good an opportunity to miss in seeking those common patterns that connect the dots. This collection of writings is a fertile soil, from which the living ecosystem of CI ideas, practices, theories, connections and actions may grow, and contribute to the emergence of CI as a field of multi-disciplinary study and practice.

To host and facilitate that emergence, Tom Atlee, our friends and colleagues in the field, and I, have been envisioning a gathering of CI practitioners, called "Collective Intelligence Convergence," for many years. That idea has been ripening through a series of iterative discussions. Hosting the interactive version of this book is its latest incarnation.

Contributors to this book are invited (although are not obliged) to host a review and revision process of their chapter online. They may also create links to other chapters or other works. Each chapter is presented in a *wikified* form and linked with a forum where authors can interact with reviewers and

contributors of supplementary material. Authors of the original chapters can create new revisions, integrating reviewers' comments. Although this is by no means the default, authors will also have the option to choose to create an "open text" version of the chapter (or sections of it) that any other author may edit.[1]

If you are a reader/explorer of the field you can:

- write a review on any chapter;
- connect points of interest to you with a *hypertrail*;
- participate in conversations about the subject of any chapter; and/or
- publish your own CI-related content.

Such public participation is an opportunity for CI Convergence to become a living laboratory, a platform for advancing CI practices worthy of replication, as well as a repository for the shared knowledge and intelligence of the CI field itself. All are invited to the edge of the field, which always involves constant interactive exchange among researchers and practitioners. We know that the state of the world needs collective intelligence more than ever, and more urgently than ever. May the conversations started by your engaging with the ideas of this book contribute to that goal.

See you online at http://cic.evolutionarynexus.org.

George Pór [2]

[1] This book, and the online version of the book at www.oss.net/CIB, are the "record" copies and will remain stable. We will encourage a similar initiative for the forthcoming books on Peace Intelligence and Commercial Intelligence—all three comprise the first half of the new over-arching discipline of Public Intelligence. Anyone interested in hosting a book online can find excellent guidance at this URL: http://www.shambhalainstitute.org/resources/how_to_host_a_book.pdf. .

[2] George Pór's biographic summary can be found at his first contribution, page 235.

What is collective intelligence and what will we do about it?

Thomas W. Malone[1]

Edited transcript of remarks at the official launch of the
MIT Center for Collective Intelligence
October 13, 2006

It now falls to me, at this point in the program, to give you an overview of what collective intelligence is, in the first place, and what we'd like to do about it. The working definition of collective intelligence that we're using is that *collective intelligence is groups of individuals doing things collectively that seem intelligent*.

Now, if you think about it that way, collective intelligence has existed for a very long time. Families, companies, and countries are all groups of individual people doing things that at least sometimes *seem* intelligent. Beehives and ant colonies are examples of groups of insects doing things like finding food sources that seem intelligent. And we could even view a single human brain as a collection of individual neurons or parts of the brain that collectively act intelligently.

But in the last few years we've seen some very interesting examples of new kinds of collective intelligence:

[1] Thomas W. Malone (http://cci.mit.edu/malone/) is the Patrick J. McGovern Professor of Management at the MIT Sloan School of Management. He is also the founder and director of the MIT Center for Collective Intelligence and author of the book *The Future of Work.* Professor Malone has published over 75 articles, research papers, and book chapters; he is an inventor with 11 patents; and he is the co-editor of three books: *Coordination Theory and Collaboration Technology*, *Inventing the Organizations of the 21st Century*, and *Organizing Business Knowledge: The MIT Process Handbook*. For further information about the Center, please visit: http://cci.mit.edu.

- Google, for instance, takes the collective knowledge created by millions of people making websites for other purposes and harnesses that collective knowledge—using some very clever algorithms and sophisticated technology—to produce amazingly intelligent answers to the questions we type in.
- Wikipedia, at another extreme, uses much less sophisticated technology, but some very clever organizational principles and motivational techniques, to get thousands of people all over the world to volunteer their time to create an amazing on-line collection of knowledge.
- In just a few minutes, you'll hear from Alph Bingham, the CEO of a company called InnoCentive, which lets companies with difficult research problems harness the collective intelligence of thousands of scientists, in a network all over the world, to help solve those problems.
- A lot of companies today—Hewlett Packard, Eli Lilly, Google and others—are now beginning to use things called prediction markets where people buy and sell predictions about future events (like sales of their products) in ways that leads to more accurate predictions in many cases than traditional market research or polling or other techniques.

Now, I think these examples are just the beginning. With new information technologies—especially the Internet—it is now possible to harness the intelligence of huge numbers of people, connected in very different ways and on a much larger scale than has ever been possible before. In order to take advantage of these possibilities, however, we need to understand what the possibilities are in a much deeper way than we do so far.

So, it's time to make collective intelligence a topic of serious academic study. And that is our goal in the Center for Collective Intelligence.

The key question we're using to organize our work is: *How can people and computers be connected so that collectively they act more intelligently than any individual, group, or computer has ever done before?*

In order to answer that question, I think at least three types of research are needed. The first is just *collecting examples* or case studies. I think there are going to be a lot of natural experiments going on in the next few years, people trying lots of interesting things—with or without us. But I think that we can help the world learn from its experience with all these natural experiments by

systematically describing and collecting examples of interesting cases of collective intelligence.

For instance, Eric von Hippel, in the Sloan School, has done some very interesting case studies of how the collective body of users of a product is often a better source of innovation for a company's products than the company's own researchers. This kind of case study research is common in business schools, but it is certainly not the only kind of research we need to do.

Another kind of research we need to do is something that is more typical in an engineering school. That is to *create new examples* of the phenomena we want to study. If you're an aeronautical engineer, for instance, you wouldn't just study birds and flying insects, you'd also want to create some flying machines and study how they work. In our case, that means we want to create some new examples of collective intelligence and study how they work.

For instance, Mark Klein in the Center for Collective Intelligence is leading a group of people in a nascent project that hopes to harness the collective intelligence of thousands of people around the world to help deal with the problems of global climate change. We have some specific technical ideas about how to combine computer simulation techniques with online ways of representing issues and positions and arguments that we think may be helpful in this process.

In the process of creating new examples, we hope to advance the state of the art and to learn new design principles not just for the technologies, by the way, but also for the human, the organizational, the social, and the motivational systems that are needed for these systems to work effectively.

But case studies and creating new examples are not the only things we need to do. I think we also need to do *systematic studies and experiments*. For instance, in some cases, we'll find examples of things that work well but we won't know why from just a case study. So we need to do systematic experiments to help figure those things out. This is the kind of research that would be more often done in a school of science or a school of social science. For example, Sandy Pentland (in the Media Lab), Drazen Prelec (in the Sloan School), and Josh Tennenbaum (in the Brain and Cognitive Sciences department) are all doing different laboratory experiments about different ways of helping groups make predictions more effectively.

But these three things—case studies, new examples, and systematic experiments—are not the only things we need to do. We also need new *theories* to help tie all these things together. I think that is especially important in the case of collective intelligence because there's now a lot of hype and prejudice going around about collective intelligence.

On the one hand, there are people who think that collective intelligence is magic, and if you just add it, it'll make everything wonderful. For instance, there is a book called *The Wisdom of Crowds* by James Surowiecki who—by the way—does not believe what I just said. But many people who've heard about his book do believe it. They think that just doing things "collectively" will make everything great.

On the other hand, there are people who are prejudiced against the very notion of collectiveness and decentralization. Very recently, for instance, there have been a number of people who've looked at the success of Wikipedia and pointed out ways in which is not perfect. And then, based on that, they have argued that nothing without central control can ever be successful.

Now, I think both of these extremes are equally wrong. Sometimes collective intelligence is good; sometimes it isn't. Sometimes it works, and sometimes it doesn't. A very important part of our goal is to help put a more solid scientific foundation under the claims in this area.

Fortunately, we don't have to start from scratch in doing that. There's already a lot of good work that has been done in many fields, including psychology, organization theory, artificial intelligence, brain science and others. Part of what we want to do is to help organize the work that has already been done. But even if we had already organized all of the results of all of the previous research, there would still a lot to learn. New technologies are now making it possible to organize groups in very new ways, in ways that have never been possible before in the history of humanity. And no one yet understands how to take advantage of these possibilities.

We certainly don't have all the answers yet; we're just beginning to ask the questions. We hope we can make a contribution just by helping to frame the questions better and also contribute to scientific understanding in many different disciplines and help us understand new and better ways to organize businesses, to conduct science, to run governments, and—perhaps most importantly—to help solve the problems we face as society and as a planet.

Co-intelligence, collective intelligence, and conscious evolution

Tom Atlee[1]

My work on collective intelligence evolved out of my progressive social change activism. On the 1986 cross-country Great Peace March, I had a number of profound experiences of leaderful self-organization and group mind solving collective problems, e.g., http://taoofdemocracy.com/prologue.html. I wanted to bring that capacity to progressive groups. My research led me to work with corporate consultants—with whom I would not have otherwise had any contact as an activist!—doing leading-edge work on group intelligence and organizational learning. When I realized that this approach could be used to convene diverse perspectives into collectively wise democratic guidance systems for communities and nations, my activism shifted from a partisan to a holistic worldview, and I coined the term "co-intelligence" to cover all ways to evoke the wisdom of the whole on behalf of the whole.

Conceptually, co-intelligence embraces more than collective intelligence (CI), the intelligence of groups. It includes at least multi-modal intelligence, collaborative intelligence, resonant intelligence, universal intelligence, and wisdom. (see http://tinyurl.com/2l28nh) By itself—and especially without wisdom (embracing the big picture)—collective intelligence, like individual intelligence, can be used in harmful ways, such as building gas chambers and new technologies with disastrous "side effects". I coined the term co-intelligence to provide a conceptual space for all holistic dimensions and forms

[1] Tom Atlee is a social change pioneer and visionary, author of *The Tao of Democracy: Using Co-Intelligence to Create a World that Works for All* and founder of the nonprofit Co-Intelligence Institute http://co-intelligence.org. This book would not have been possible without his identification and encouragement of many of the pioneers who helped create the book, which then allowed the editor to attract additional leaders in the field to contribute to this collective endeavor.

of intelligence, as collectively they have more intrinsically benign social implications. I like to keep this useful distinction clear, and not use the term "co-intelligence" interchangeably with "collective intelligence".

My book and website explore in more detail all six manifestations of co-intelligence mentioned above. Here I will focus on just collective intelligence, after setting a few more pieces of narrative context.

My work on societal/systemic co-intelligence led me to develop a new theory of holistic or wise democracy, in which leading-edge forms of dialogue, deliberation, information systems, etc., would be practiced and institutionalized to access the latent wisdom of We the People on an ongoing basis—a theoretical possibility recognized by U.S. founders, but seldom realized in practice.[2]

My research on deliberative forms led me to recognize a number of them—e.g., American and British citizens juries, Canadian citizen assemblies, Danish consensus conferences, and German planning cells—as constituting a category I named "citizen deliberative councils" (CDCs). CDCs are made up of randomly selected ordinary citizens (a microcosm of the community, state, or country) convened for a limited time to study and reflect on a particular topic or issue—including interviewing experts from across the spectrum of opinion—and, after facilitated deliberation, sharing their collective insights and conclusions with the public, press, and relevant public officials. A number of academics and politicians have envisioned a wide variety of powerful institutionalized roles for CDCs, notably to review ballot initiatives and candidates on behalf of the broader public ("citizen initiative review"). Much of my book *The Tao of Democracy* describes CDCs and their role in a larger "culture of dialogue."

After years of promoting CDCs and wise democracy, I was exposed to the idea that we are a newly conscious manifestation of the 13.7 billion year evolutionary process. In a profound moment of realization, I saw that all the co-intelligent processes and factors I had been talking about for 15 years were tools for bringing increased consciousness—intelligence, wisdom, intentionality, choice, awareness, etc.—to our collective efforts to improve our shared circumstances. They were, in fact, manifestations of the increasing

[2] A DVD, "From Group Magic to a Wise Democracy," is available.

consciousness evident in the evolutionary process. The fact that these co-intelligent processes could help us consciously deal with the 21st century's extinction-level issues (nuclear war, extreme climate change, rampantly destructive technologies, emerging diseases, etc.) made it even clearer that we were dealing with conscious evolution. If we survive this century with flying colors, we will be a very different civilization than we are now—that is, we will have evolved, as a family of cultures, into more co-intelligent forms.

The realization that our efforts to enhance our co-intelligence were basically us *being* conscious evolution, led me to shift my inquiry into "What evolutionary dynamics can inform our efforts to consciously evolve our culture and social systems?" This research is underway at the time of this writing, and this conscious evolutionary perspective now informs everything I do.

That is the outline of the history of my life's work. Along the way, my natural impulse as a philosopher has been to gather together all the ideas, dynamics, and tools I can find within this realm, to categorize them, and to create overarching theory and vision that show how they can relate and be applied together to address social and environmental challenges. As part of that, I did a variety of analytic breakdowns of collective intelligence, a few of which I offer below. Others can be explored through http://tinyurl.com/2n6sqk.

Scales of Collective Intelligence

Human systems in which we can observe and nurture collective intelligence:

- INDIVIDUAL collective intelligence (collective intelligence among our own internal subjective parts and voices)
- INTERPERSONAL or RELATIONAL collective intelligence
- GROUP collective intelligence
- ACTIVITY collective intelligence
- ORGANIZATIONAL collective intelligence
- NETWORK collective intelligence
- NEIGHBORHOOD collective intelligence
- COMMUNITY collective intelligence
- CITY collective intelligence
- COUNTY/SHIRE collective intelligence
- STATE/PROVINCE collective intelligence

- REGIONAL collective intelligence
- NATIONAL / WHOLE SOCIETY collective intelligence
- INTERNATIONAL GROUP/NETWORK/ORGANIZATION collective intelligence
- GLOBAL HUMANITY collective intelligence

Reflections on Forms of Collective Intelligence (CI)

Although my specialty has been in the realm of democratic and deliberative forms and approaches to collective intelligence, I have run across many others. So several years ago I decided to brainstorm a possible taxonomy for them. This proposed taxonomy is, of course, only one way to cut the pie. However, it is the first such attempt I know of to embrace the full spectrum of ideas and practices which the practitioners describe with comparable terms like "collective intelligence", "community wisdom", "organizational learning", etc.

Perhaps most importantly, this taxonomy outlines what might be considered a new field of study and practice. Given the potentially key role such practices could have in the future of our planet and civilization, I hope this initial listing will help call forth an evolving general theory of collective intelligence—and an inclusive discipline and network of theoreticians, practitioners and advocates—that embrace all existing and future variations of collective intelligence.

Note that not all collective capacities are "intelligence." Occasionally collective intelligence (CI) overlaps with other capacities like collective consciousness or "power-with"— capacities that can be characterized by collective stupidity OR collective intelligence. Furthermore, some dimensions of collective intelligence, like "flow," have collectively stupid manifestations (mobs) as well as collectively intelligent ones (high-functioning teams). I will try to navigate these distinctions creatively here, but the reader should keep them in mind.

Note also that some phenomena that I have not included here could conceivably be included in this list. For example, are "networks" an intrinsic form of CI, or are they a pattern useful in developing CI? I have chosen the latter categorization, but people more familiar with networks may be able to make a case for them as a distinct form of CI.

Some Forms of Collective Intelligence

REFLECTIVE (dialogic) CI — People think together, using dialogue and deliberation. They find and share information, critique logic and assumptions, explore implications, create solutions and mental models together. Their diversity, used well, helps them overcome blind spots, ignorance, and stuckness. They see a bigger, more complete picture with more complexity and nuance, and develop better outcomes than they could alone. Most of this can be readily explained in terms of cognitive synergies among the participants.

STRUCTURAL (systemic) CI — Social systems are built that support intelligent behaviors on the part of the system as a whole and/or all its members. For example, the Bill of Rights supports creativity, free flow of information, and maintenance of diversity—all of which support collective intelligence. Quality of Life indicators guide national economic activity more intelligently than the wholly monetized Gross Domestic Product statistic. Chairs placed in circles support equity and sharing in ways impeded by chairs placed in rows.

EVOLUTIONARY (learning-based) CI — Organisms, species, ecosystems, and cultures are made of patterns of relationship that have "worked" over long periods. These co-evolved, built-in success-patterns contain embedded wisdom often used automatically, but which are also available for analysis and deeper learning (e.g., biomimicry). We can look at them as manifestations of learning—or perhaps of "evolving coherence." Evolving coherence is perhaps most consciously pursued in the careful, grounded, ongoing collective inquiries of science, but we can also find it in any shared learning effort, an endeavor institutionalized in academia. Evolving coherence is also characteristic of morphogenic fields—the living habit-fields of life that arise from our collective experience and shape our consciousness and behaviors. Any patterns evolved (or understandings learned) become part of informational CI, below.

INFORMATIONAL (communication-based) CI — The flow of information through communication channels and the widespread gathering and persistent availability of information in databases (including libraries, newspapers, etc., as well as the Web and morphogenic fields) means that knowledge that is created or recorded in one place and time is available to others in other places and times. Universal access to information informs the activities of diverse, dispersed people beyond their individual data-gathering capacities. In society,

this form of collective intelligence has been aided in the last century by telecommunications and computer technologies, as it was centuries ago by the invention of printing. To a large degree, the informational sea we live in empowers the routine collective intelligence of our society or subculture. In fact, the complexity of modern society makes most information-gathering intrinsically collective (through scientists, statistical enterprises, journalism, etc.); any given individual simply cannot find it all out. Furthermore, our culture's informational, narrative and morphogenic fields shape our awareness and behavior without our even knowing it. The dark side of the informational mode is the sea of unproven assertions and unexamined assumptions we experience as fact that, being unexamined, may be false or go out of date and—resisting change (evolutionary CI)—become the source of collective stupidity.

NOETIC (spiritual or consciousness-based) CI — Certain realms of human experience are accessible primarily through altered/higher states of consciousness or esoteric practices. All these phenomena are grounded in "consciousness," so we need to remember that "intelligence" is the capacity to learn new things and solve challenging problems. The term "collective intelligence" may be most appropriately applied to the noetic mode assuming these higher/deeper realms are accessed by a group together such that the group's subsequent understanding and activity are demonstrably intelligent. The noetic realm tends to be anchored in *subjective* experience, although there is growing *objective* evidence for various noetic phenomena. The noetic experience of CI would be one of "accessing" or "attuning to" a pre-existing higher intelligence or awareness, rather than of co-creating a new capacity through group synergy (as in reflective mode).

FLOW (mutual attunement-based) CI — When the boundaries between individuals vanish, become permeable, or fade into relationship or shared enterprise, a collective can think, feel, respond and act as one entity. This "group magic" is exemplified by—and experienced in—intense dialogue groups, high-functioning human teams and non-human collectives like flocks of birds. Basic forms of flow or flocking behavior are achieved by individuals following simple rules about their relationship to those around them, setting aside independence in the realms covered by the rules. This (flow, flocking behavior) happens even when the individuals are computer-generated agents like "boids" or "cellular automata." More complex, creative forms of flow occur when conscious, distinct individuals are so attuned to each other that they

can innovate and express their uniqueness in thoroughly appropriate/embedded ways, as with jazz improvisation. Flow may also be associated with mobs, groupthink and other dysfunctional collectives in which individuality itself is stifled or dissolved. But for our purposes here the term collective intelligence is reserved for collective cognitive capacity and behavior that is highly functional. Flow is often a dimension of that. Some think that extreme forms of flow manifest as mind-meld and collective consciousness (the global version of which de Chardin called The Omega Point) that may or may not be collectively intelligent. But core individuality is a resource for collective intelligence, providing diversity and creative energy. So flow can be understood as dissolving the boundaries, barriers and battles of individualism (ego) in order to better tap the powerful essence of individuality (true uniqueness and individual capacity) in the context of collective activity.

STATISTICAL (crowd-oriented) CI — In the presence of a goal, intention, inquiry or direction—and no skewing factors (e.g., deceit)—a high enough number of individuals will generate a remarkable level of collective problem-solving or predictive power, even in the absence of communication among them. This has been demonstrated in many cases of mass guessing, where the average guessed solution has proven superior to over 90% of the individual guesses. This can also be seen in ants whose almost random foraging is capable of rapidly finding food that can then be collectively accessed in very focused ways. Computer-generated entities also demonstrate this statistical intelligence: When the first-run-through maze-paths of about two dozen intelligent agents are superimposed over each other, the plot of the majority decision at each turn of the maze will often be a direct path through the maze—one that was not followed by any single agent. This form of collective intelligence—combined (often implicitly) with structural and other forms—is what some term "market intelligence," Adam Smith's "invisible hand".

RELEVATIONAL (emergence-based) CI – "Relevation" is a term coined by quantum physicist and dialogue innovator David Bohm. It names the dynamic through which phenomena emerge (elevate) from potentiality (Bohm's "implicate order") into actuality (Bohm's "explicate order") by reason of their relevance to existing reality. Our inquiries and intentions can attract insights and solutions, often seemingly "out of nowhere." As a form of collective intelligence, this may be most vividly displayed by one person saying something and another person mis-hearing it in a way that provides them with

some answer or insight. The answer, which was never spoken or intended, relevated out of the space between them, drawn into existence by the second person's desire to know that answer.

These eight forms of collective intelligence (and probably other forms as well) can manifest fairly independently, but in most cases several overlap and combine in a variety of ways. For example, high quality democratic deliberations (reflective CI) can be designed into a political and governmental systems (structural CI)—and those institutionalized deliberations can then do the subsequent social and policy design work (full merger of reflective and structural CI). Insight in deliberative groups (reflective CI) can come from higher sources of wisdom (noetic CI) or from communication or the Internet (informational CI)—and often through relevational CI, in either case. And, as mentioned, flow and statistical CI are governed by intentions and rules that can be shaped by the design elements of structural CI (such as Gross Domestic Product). The phenomenon called "hive mind" is mostly a combination of flow and statistical CI. Dialogue (reflective CI) is a great way to create new knowledge or examine assumptions (informational and evolutionary CI). Organizational vision efforts use informational and structural CI (the vision or mission of the organization) and often dialogue about the vision (reflective CI) to help the organization's subsequent reflective, statistical, and flow forms of CI manifest more naturally and coherently. And so on.

Different CI innovations will tend to focus on one or a few of these forms of CI—and there is need to continually explore how they all fit together. Those interested in social change and organization will tend to focus on the first four which are most amenable to conscious shaping, while those interested in beingness will tend to focus on the last four as they are heavily experiential and nonlinear. Again, part of our challenge is to bring all these together in more productive ways.

Emerging and converging fields involving collective intelligence

The following fields of study and practice have an emergent, leading edge quality to them and, at the same time, seem to be overlapping more and more, and even converging into an increasingly coherent understanding of the intelligence of whole systems, and of life as a whole. Increasingly, these fields are using methodologies, language, metaphors, and narratives from each other

to support and describe what seem to be manifestations of the same patterns in different realms and at different levels.

We can further the evolution of our culture(s) towards becoming a global wisdom society by supporting these diverse fields to discover each other, talk together and collaborate. I suspect this list is not complete. I hope others will add new fields or emergent factors that they see as part of this convergence toward greater collective intelligence. But these are the ones that come to my mind at this point:

- "group magic," especially through dialogue or attunement (e.g., collective meditation), including all the methodologies of healthy group co-creativity
- self-organization theory and methods—including chaos and complexity theories, living systems theory (including cybernetics, ecology, permaculture and evolutionary biology), network theory, the "invisible hand" of the market, "swarm intelligence," and flocking behavior, etc.
- the dynamics of collective behavior studied by social psychology
- transpersonal and Jungian psychology, non-dualistic spirituality, and other studies of psycho-spiritual phenomena beyond the individual ego
- "revitalization" of community and democracy, including public participation, deliberative democracy and creative forms of spiritual politics, community organizing and nonviolent activism
- "open source" challenges to the proprietary confinement of knowledge, innovation and co-creativity
- "open source intelligence" challenges to the over-dependence on spying and secrecy that neglects public sources of information and inhibits cross-fertilization of intelligence not only in government but in society at large
- information, communication and knowledge systems (usually computer-based or -enhanced) (most of the "global brain" theories are grounded here)

- theories that expand our understanding of intelligence and cognition—both individual and collective—including some leading-edge educational theories
- the 21st century imperative for transformation, evolution and wisdom (driven by global crises and often based in spirituality)—and our growing understanding of the dynamics of transformation and evolution. This relates to the human potential movement, especially as it expands into social and collective human potential. It is also central to the conscious evolution and "Great Story" (seeing evolution as a sacred and meaningful) movements.
- participatory and collaborative practices in all sectors and for all reasons
- the study and use of "decision markets" (systems for aggregating the independent actions, bets or estimates of hundreds of people)—for prediction, fact-guessing and pattern-clarification (e.g., Amazon.com's "people who bought this also bought that" function, a manifestation of "stigmergy", which we see especially in ant colonies, where the collective organization is achieved not through interpersonal communication so much as through individual communications with the shared environment)
- holistic studies of all types, including general exploration of the nature of wholeness and the relationship between parts and wholes
- group and organizational dynamics, particularly studies of dysfunctional "groupthink" as well as the theory and practice of learning organizations, teams, communities of practice and similar approaches to organizational development
- work on the many manifestations of human difference—including conflict, polarization, stakeholders, personality types, cognitive styles, socially charged "diversity" (race, gender, class, etc.), and so on—and the role of diversity, in general, in living systems

May we discover ways to bring all these together in the service of humankind.

A metalanguage for computer augmented collective intelligence

Prof. Pierre Lévy, CRC, FRSC[1]

The semantic interoperability problem

The universe of communication opened up to us by the interconnection of digital data and automatic manipulators of symbols—in other words, cyberspace—henceforth constitutes the virtual memory of collective human intelligence. Yet, *at the symbolic level*, important obstacles hinder digital memory from working fully in the service of an optimal management of knowledge. These obstacles can be decomposed into two interdependent sub-groups.

The first one concerns the multiplicity and the incompatibility of symbolic systems:

- plurality of natural languages;
- incompatibility and inadaptation of the numerous indexation and cataloguing systems inherited from the print era (that were not designed to exploit the general interconnection and computing power of cyberspace);
- multiplicity and incompatibility of taxonomies, thesaurus, terminologies, ontologies and classification systems.

[1] Pierre Lévy is a philosopher who devoted his professional life to the understanding of the cultural and cognitive implications of the digital technologies, to promote their best social uses and to study the phenomenon of human collective intelligence. Additional biographic and reference information is on the last page of this chapter.

The second sub-group of obstacles concerns the difficulties encountered by computer science when it tries to take into account the *meaning* of documents by means of general methods.

Current commercial search engines base their search on *strings of characters* and not on concepts. For example, for example, when a user enters the request « dog», this word is processed as the string of characters « d, o, g » and not as a concept that could be translated in several languages (*chien*, *kelb*, *cane*...), belonging to the sub-classes of mammals and pets, and constituting (for example) the super class of bull-dogs and dobermans.

The so-called semantic web, despite its technical sophistication, still does not foster the practical progress in the organization and retrieval of collective memory that is expected from it. It suffers from the same limitation of perspective as the artificial intelligence. For its leaders, the task of exploiting the computers for the augmentation of human intelligence is restricted to the automation of *logical operations* on standard *data formats*. The design of original symbolic systems for the notation of meaning that could take advantage of the new possibilities of automatic processing at the service of human collective intelligence is not addressed by the semantic web.

The IEML initiative

In order to overcome the contemporary obstacles to a full exploitation of the new opportunities opened up by cyberspace to human collective intelligence, the Canada Research Chair in collective intelligence at the University of Ottawa has undertaken the task of designing and implementing a metalanguage for semantic addressing. The metalanguage is called IEML for Information Economy MetaLanguage.

The Information Economy MetaLangage (IEML) is a formal language for the expression of *semantic sets*. It is designed to denote formally—or to address—concepts as semantic sets. Concepts, and networks of concepts, of whatever complexity, can be formalized and *uniquely identified*—or addressed—by semantic sets expressed in IEML.

Thanks to the regularity of IEML grammar (that is designed in such a way that semantic structures are mirrored by syntactic structures); many *computable functions* can be applied to IEML expressions, including ordering, visualization and semantic distance measurement functions.

To avoid any misunderstanding, I want to stress here that IEML is not supposed to replace or compete with any *data format* like XML, RDF or OWL. IEML has been designed to replace *natural language expressions* in whatever data format. The use of IEML expressions to tag semantic metadata on digital documents may be preferred to the use of natural language expressions because semantic sets expressed formally in IEML allow a larger range of computable functions. So, the IEML initiative is not competing with the semantic web: it prepares the erection of the *next layer* of cyberspace.

IEML grammar is a singular abstract structure that can be expressed by different syntaxes (or notation systems) according to different purposes. For example, there is an XML-IEML syntax (XML: eXtended Mark-up Language) and a STAR-IEML syntax (STAR: Symbolic Tool for Augmented Reasoning). In STAR syntax, the semantic addresses begins by a "*" end are closed by a "**". There is an objective relationship between semantic addresses expressed in STAR-IEML and semantic addresses expressed in XML-IEML. In general, automatic translations can be provided between different IEML syntaxes because they share the same grammar. For practical purposes:

- IEML expressions of semantic sets can be used as *semantic metadata*;
- IEML is the basis for the expression of *IEML ontologies*, that can be defined as functions on semantic sets, including relations between semantic sets;
- IEML paves the way for a generation of semantic search engines and tagging machines that can be customized according to their original semantic perspectives but can also cooperate by a *collective intelligence protocol* for the standard exchange of semantic metadata.

An on-line IEML-natural languages dictionary establishes the correspondence between the expressions of the metalanguage and their interpretation in natural languages. The grammar, dictionary and various software modules based on the use of the metalanguage are open-source and available for free.

The Layers Of Digital Memory Addressing

In order to understand the need for a new layer of memory addressing in cyberspace, we have to analyze the arrangement of the preceding layers.

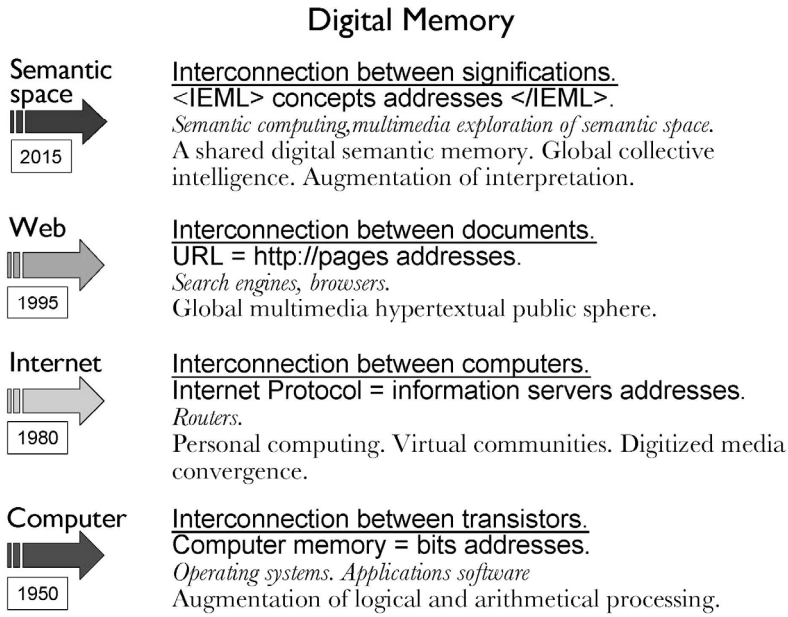

Figure 1: Layers of Digital Memory Addressing

First Layer (bit addressing)

At the level of the computers that compose the nodes within cyberspace, the local system for addressing *bits* of information is managed in a decentralized fashion by various operating systems (such as Unix or Windows), then used by software applications. The development of computing in the 1950s created technical conditions for a remarkable augmentation in the arithmetical and logical processing of information.

Second Layer (server addressing)

At the level of the network of networks, each *server* has an attributed address, according to the universal protocol of the Internet. IP (Internet Protocol) addresses are used by the information routing—or commutation—system that makes the Internet work. The development of the Internet in the 1980s corresponds to the advent of personal computing, the growth of virtual

communities, and the beginning of the convergence of the media and telecommunications in the digital universe.

Third Layer (page addressing)

At the level of the World Wide Web, the *pages* of documents, in turn, have a universal address according to the universal system of URLs (Uniform Resource Locator), and the *links* between documents are handled according to the HTTP standard (HyperText Transfer Protocol). Web addresses and hypertext links are used by search engines and Web surfers. The popularization of the Web from 1995 onward helped give rise to a global public multimedia sphere.

Fourth Layer (concept addressing)

The Semantic space takes the form of an additional layer of digital memory, resting on a universal addressing system for *concepts*: IEML. As a *coordinate system of the semantic space*, IEML makes it possible to automatically manage the relationships among the meaningful content of documents, and this independently from the natural languages in which the documents are written. Semantic computing is dedicated to the automatic manipulation of IEML expressions that address the data. In so doing, it increases human capacity for *interpretation* of the virtual memory from a practically infinite array of semantic perspectives. New devices for *multimedia exploration* of the dynamic universe of concepts could take support from semantic computing.

A glimpse into the generative semantics behind IEML

The epistemological principle that has guided me into the invention of IEML is that the complexity and the variety of the automatic operations that can be performed on variables depend on the structure of the variables. Accordingly to this principle, IEML is a symbolic system the expressions of which allow a greater range of automatic operations than the expressions of natural languages. The core of IEML regularity is its generative structure. A full technical description of IEML is not possible in the context of this book. Nevertheless, I can propose here to the reader to have a glimpse into the "generative semantics" that is at the basis of the metalanguage.

Any IEML expression of a semantic set is composed from five primitive elements and an empty subset of elements. Sets and subsets of primitive elements are represented by ten characters.

From the primitive elements of the first layer, a *generative operation* produces recursively five layers of generated elements called flows. So, there are six layers in the IEML stack.

Except for the first layer, the elements of which are primitives, a flow of layer n is a triple (source, destination and translator) of flows from the layer n-1. The first role of a flow of layer n is an element of layer n-1 and is called the source of the flow. The second role of a flow of layer n is an element of layer n-1 and is called the destination of the flow. The third role of a flow of layer n is an element of layer n-1 and is called the translator of the flow. The order of magnitude of the number of semantic elements at layer 6 is: 10^{69}.

Punctuation marks, here in the layer generative order (: . – ' , _) explicitate the generative operations and permit the parsing of expressions.

Example:

*M:O:.** == *(S:U:.|S:A:.|B:U:.|B:A:.|T:U:.|B:A:.)**

The expression *M:O:.** is a category of layer 2, so it is closed with a "."

*M:** is the source player of layer 1 (the noun-type primitive category), so it is closed with a ":"

*O:** is the destination player of layer 1 (the verb-type primitive category), so it is closed with a ":"

*S:U:.**, *S:A:.**, etc. are flows of layer 2 produced by the generative operation. As they are flows of layer two, they are closed by ".". They are structured by two roles: source and destination. The players of these roles are primitive elements of layer 1, expressed by token characters closed by the mark of layer 1 ":".

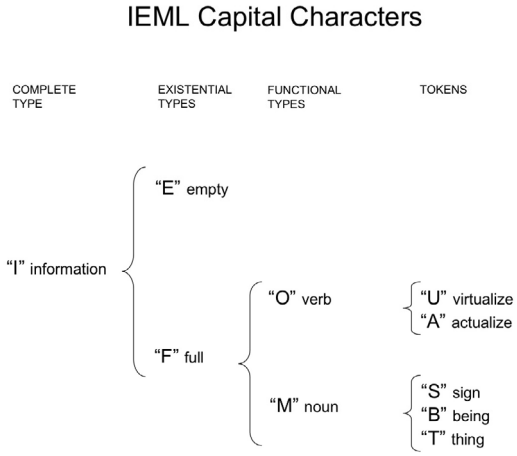

Figure 2: Layer Flows

IEML makes possible very compact expressions of all sorts of semantic sets. From the expressions of sets of layer n, the grammatical structure of IEML allows for the automatic generation of graphs (trees, cycles) and matrixes of sets from layer n-1. These graphs and matrixes can be used for navigation, visualization and channeling of information value, according to the choices of communities of users.

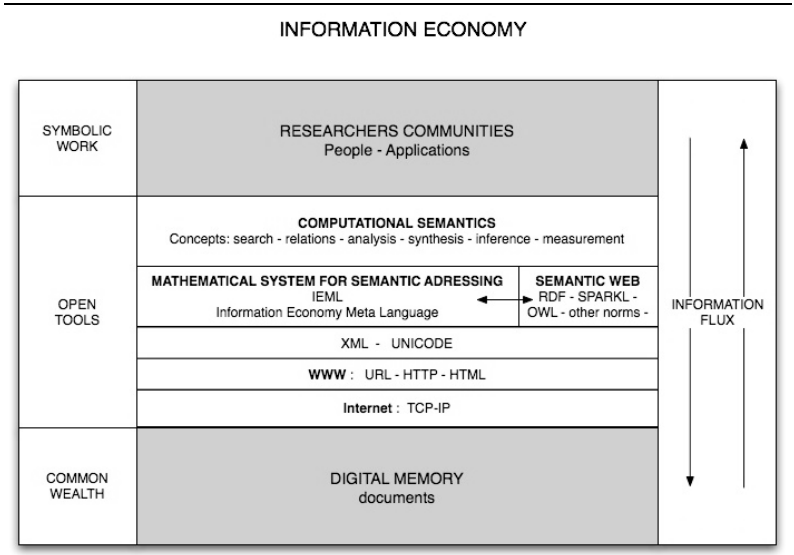

Figure 3: High-Level Overview

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Web address: www.ieml.org

Safety Glass

Karl Schroeder[1]

This story was originally written to summarize ideas generated at the Prospective Protective Futures Security Workshop, a look at Canada's security future held in Ottawa in March of 2006[2]. "Safety Glass" is an attempt to put many different lines of thought into a single scenario. While capturing something of the flavour of the workshop, in no way does it represent the participants' consensus view of 2020 A.D. It merely shows one constellation of (maybe Orwellian, maybe Utopian) future possibilities.[3]

The car's heads-up display was flashing: pull into the next checkpoint. Achala frowned and pressed the green "Okay" button, returning her attention to the map on her phone's screen. Outside, damp pines whipped past, slowing, and then with a slight bump the car found its way off the highway and rolled to a stop. Achala looked up, noticed that someone was walking toward the car—a real person, not a bot or simulation—and put down the phone.

The guard looked apologetic as he gestured at her window. Achala rolled it down and stuck her head out into the light mist that was falling. "What's up?" she asked.

He wore the uniform of some security group or other; through the blurring of the rain she wasn't sure whether it was private or public, national or provincial. "Excuse me, Ma'am," he said, "but you've filed an unusual itinerary. Driving into the woods south of Cultus Lake? Our system flagged it."

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[1] A rising star in the Science Fiction (SF) world and a *New York Times* notable author, Karl Schroeder divides his time between writing fiction and consulting—chiefly in the area of Foresight Studies and technology. http://www.kschroeder.com

[2] It later appeared on *Worldchanging Canada*: worldchanging.com/local/canada/archives/005349.html

Achala grimaced. “I’m a biologist. I’m tracking an unusual cluster of seagull deaths. That’s where the bodies are.”

The guard squinted at her. “You’re a Canadian citizen.”

“I guess. I’m really a citizen of The Cities. Cascadia.” She nodded past the trees, which hid the vast sprawl of urbanized land that stretched from North Vancouver to well south of Seattle. The RFID tag in her arm held all her citizenship information and would have been sensed as her car drove under one of the highway sensors. That invisible, inaudible blip of information should have told this guy all he needed to know about her. She could travel between any of the world’s megacities without any hassles, as a citizen of Cascadia able to walk the streets of Shanghai or Mexico City freely and, to all intents and purposes, invisibly. Yet this security guard was complaining about her driving a few miles south of a local lake?

He sighed. “Ma’am, the place in question is inside the United States.” Now she spotted the U.S. Customs patch on his shoulder.

“Ooooh.” She grinned sheepishly. As a citizen of The Cities she could travel anywhere within the Seattle/Vancouver corridor; it seemed all one place and it was easy to forget that there was a national border bisecting the city. Different realities held out here beyond the suburbs.

“So you want to inspect my car? See if I’m smuggling or something?”

He caught the look on her face and chuckled. “Don’t look so put out. This sort of inspection happens every time you cross the national border inside the city. You just don’t notice it because the sensors are hidden.”

“So what do I do?”

“Nothing. Your car was sprayed with smart dust when you rolled in here,” he said. “We’re completing the analysis now. But I need to ask you a little more about what you’re going to be doing out there.”

She handed him her phone. “See? It’s a public website—the blog of the Ekaterina Group B seagull flock. The smart dust on the seagulls monitors them in realtime and posts information on their health and position and stuff on the website. The site flagged an unusual cluster of deaths over the past week. We’re wondering whether it’s just predation, or whether it’s a sign of the new flu.”

“The dust can’t tell you?”

Achala scoffed. “You can’t put a whole bio-analysis lab in a smart dust chip. That would be... science fiction.”

“Yeah, I guess.” He glanced in the back seat, saw the roll of plastic sheeting, the box of disposable latex gloves. Then he tilted his head at that odd angle people tended to use when their hands-free headset was talking to them. “Okay, Ma’am, you check out. Have a nice day.”

Achala managed to smile casually enough at him, but her hands were trembling slightly as she manually drove back to the on-ramp. Switching the car back to automatic drive, she thumped her head back in the seat and blew out a heavy sigh. Then she picked up the phone and hit speed-dial.

“I just got stopped. By the border police, no less.”

“Nothing to do with you,” said the man on the other end of the line. Then, he paused. “Do you still want to go through with this?”

She laughed tightly. “Yeah. It just seems... more real now, that’s all.”

The car settled into its lane and sped up. To distract herself, Achala flipped down the visor screen and tuned to a news channel. This was a customized channel she’d built for herself; it filtered newsfeeds from all over the world and organized, translated and subtitled them, presenting her with a daily menu of items. There were the usual items, she saw:

- Rebels fighting the decolonization of old growth rain forest had burnt another section of old growth. The U.N. and various NGOs were decrying the act as a crime against humanity.
- Schematics that would allow you to build a fuel/air bomb using your home 3d printer had started circulating on the net. This was worrisome, but since the internet’s fragmentation after the two-tier pricing of network services, items like these plans couldn’t propagate all around the world in a matter of hours anymore, like they used to. —Of course, neither could your email.
- There were riots over the cutting of more services to the Florida shanty-towns that had grown up in the wake of the submerging of the everglades.

- It was rumoured that an international terrorist ad-hocracy organized and run through on-line shared worlds was trying to acquire biological weapons.

Watching this last item, Achala felt her pulse start to race again. She shut off the screen and leaned back. *Don't think about what you're doing*, she told herself. *That's the best way to get through it*.

It had taken her a year to get to this point, after all; ever since she had filled out that first on-line form on the WikiSecurity web site, Achala had been determined to follow through on whatever eventually came of her application. Her assignment, when it came, had turned out to be deceptively simple.

Drive into the forest and return with some dead birds.

The seagull flock whose members had died was just one of thousands that had websites. Most pods of whales had them now, as did wolf packs, prairie dog cities and even a few murders of crows. The sites were a way to monitor the health of the ecosystem, and in return the animals often carried sensors that transmitted valuable information about local weather and air quality conditions. It was rumoured that some security agencies had eyes on rats and birds throughout Cascadia.

After about a half hour, the car pulled off the highway and took an old logging road through a roofless tunnel of trees. Achala chewed her fingernails and glanced around nervously. Had another car just pulled off the highway behind her? It was hard to see through the grey rain.

Her own car stopped and bonged politely. This was the place.

It's not as if I'm really alone, she told herself as she stepped into the chill. Her smart clothing was monitoring her health and relaying her status back to Cascadia. The web of private and public security monitoring systems that watched over her would keep her safe, she reminded herself, even as she heard tires on gravel crunch to a stop somewhere up the road.

She entered the trees, carrying a cardboard banker's box. She visited each of the GPS coordinates from the seagull flock's website, one by one. This was strictly for show: there were no dead birds out here. Three birds lay in the box; she'd brought them with her from Cascadia.

At the third site she knelt and listened. If anyone was around, they were moving very quietly. She took out her phone and dialed. “Got them. Coming in,” she said. Then she stood, feeling very exposed, and stalked back to the car.

Anything could happen now. “But it probably won’t,” they’d told her. “These people know how well individuals are monitored these days. The birds are their target, not you.” She repeated those words under her breath as she half-ran back to the car. It was getting dark. With relief she climbed in and slammed the door.

Now for the next stage of the plan.

Two weeks ago, she’d sat down in a plain office in downtown Cascadia and listened as a nondescript man outlined the operation to her. “We don’t have the manpower for this kind of thing,” he’d said. “Nobody does. So we enlist the public. Yours is just one of hundreds of honeypot operations we’re running simultaneously. Some are criminal investigations—neighbourhood watch situations. Some are military, some, well, frankly some are espionage. And some are counter-terrorist.”

“It’s the birds,” she’d guessed. “The new strain of bird flu. That’s why you picked me, isn’t it?”

He had half-smiled. “Maybe. This is a game of deception, bluff and counter-bluff, Achala. To find these people we have to trick them into revealing themselves. We try all kinds of things to do that. This is just one feeler we’re putting out.”

“But why?” she asked. “How do you know this will work?”

He shrugged. “We don’t. Someone’s been surfing the bird-flock websites in a suspicious pattern—that’s all we know. So we’ve invented a set of fake dead birds. They won’t be labeled as having died of the new flu, but anyone watching closely will find the pattern interesting. They won’t be able to get the GPS coordinates, but they’ll see your name associated with them. The birds are the bait, you’re the trap,”

This was wiki-security: the entire operation consisted of some website shuffling, and that conversation with her. The sheer number of possible security risks nowadays would swamp any conventional intelligence apparatus; as a result many operations were outsourced, distributed among thousands or even millions of cooperative citizens. For the government, the costliest component of

this particular operation was the birds and the monitoring equipment that would track them.

Achala glanced back at them once as she pulled over to a rest station near the Cultus Lake resort. She made sure she parked the car at back of the lot, under the shadow of some trees. As she slammed the car door she glanced down the road; a pair of headlights wavered there. Resolutely she looked away. Then she walked into the tiny restaurant and back to the lady's room.

She stayed there for ten minutes. About half-way through that period, the lights flickered and went out, then came on a few seconds later. She'd been warned this might happen; her phone was dead when she tried to use it. Somehow, knowing what was happening—that she wasn't just play-acting—calmed her down. She was able to count out five more minutes before she strolled out and went back to her car.

Another car's tracks deeply indented the mud; the tracks swept into the lot, passed her car, and then threaded back out.

The passenger's-side window of her car had been shattered. The banker's box was gone.

Achala smiled, and took out her phone. Oh, yes, of course it was dead—its electronics fried by the same EM pulse that had taken out the rest-stop's surveillance cameras. It didn't matter. The transmitters in the birds were hardened; even now, they were being tracked.

"Won't they detect the tracking signals?" she'd asked the nondescript man in the downtown office. He had shrugged.

"Sure. But probably not before we find out who they are. And then it'll be too late. The ripples will spread out from there—their identities will lead us to their compatriots—if they have any—and from those people we'll identify other nodes in the network. The men whom we identify will have been neutralized by being placed under automatic scrutiny; they know now that we know what they're trying to do. In all likelihood nobody will be arrested, nothing dramatic will happen. But something very dramatic will not happen now, and it will be because you helped us."

"No bird flu for you," she said to the tracks that led off into the darkening mist. Then she brushed safety glass off the seat of her car and climbed in.

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2007 State of the Future

Jerome C. Glenn & Theodore J. Gordon[1]

Urgent questions and necessary choices

In many areas the world is getting better. Life expectancy is increasing, infant mortality is decreasing, literacy, gross domestic products per capita and the number of global Internet users are increasing, and—despite Darfur and Iraq—there are fewer global conflicts.

But, the picture is not entirely rosy, according to *2007 State of the Future's* track of global progress. CO_2 emissions, terrorism, corruption, global warming, and unemployment are increasing as the percentage of voting populations decreases.

The new report, a slim print volume and a 6000-page companion CD, provides view of the world as it is, and what it might become without a collective worldwide effort to resolve what the report identifies as the top 15 global challenges.

These include the obvious—water, energy, global warming, health, sustainable development, terrorism—and some not always considered global problems, such as organized crime, which on a global basis makes more money than the world's military budgets combined, improving the capacity to decide as the nature of work and institutions change, and the need to accelerate scientific and technological breakthroughs.

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[1] Millennium Project sponsors include Applied Materials, Azerbaijan Ministry of Communications, Deloitte & Touche LLP, Foundation for the Future, Republic of Korea Ministry of Education, State of Kuwait, and the U.S. Army Environmental Policy Institute. CIM Engineering, Smithsonian Institution, UNESCO, and World Future Society provide in-kind support.

Unless the challenges are met, the future could be bleak, marred by lack of water and arable land, mass migrations, turbulent climates, economic chaos, conflagrations and other disasters that could engulf global humanity.

2007 State of the Future offers answers along with questions. Proposed solutions sprinkled throughout the report include an Apollo-like global energy development program led by China and the United States, breakthroughs in water desalination, and the restructuring of educational systems to boost both individual and collective intelligence.

A cross-section of global thinking

Information in the report reflects the thinking of a cross section of leading global players, not a group who wrote a book. "Done on a global basis on behalf of the globe, it offers collective intelligence for the planet," said Jerome Glenn, director of the Millennium Project, which each year updates and expands the *State of the Future*. "We deliberately seek a diversity of opinions, which means some of the issues raised and recommended actions seem contradictory."

A planning committee of future-oriented individuals from 29 different countries oversees the overall direction of the project. The 32 Millennium Project "Nodes" (groups of future-oriented people and institutions from business, government, academia, non-profit organizations, UN and other international agencies) have lead responsibility for a specific region. Their tasks include identifying and studying emerging issues, translating questionnaires, conducting interviews, identifying different participants each year to contribute their expertise and analyses to the project's studies, and disseminate the results and findings.

"The Nodes are unique," said Glenn. "Each is an intersection of networks, a new management response to global-local needs. This is probably the first globalized think tank," he added. "The research has a richness that goes beyond more traditional think tanks." Each year the *State of the Future* report is written and compiled by a staff of four, with assistance from interns, and operates on a shoestring budget of about $300,000 each year.

Designed to meet the needs of both decision makers and academics, the combination of a short print volume and expanded CD resolves the age-old contradiction between a small amount of information to help decision makers think through options and the detailed information required by academics to be sure the work is "honorable."

To suit both audiences, the print document is brief and "sensitive to information overload," said Glenn, but the detail is there—on the CD—for those who want it. The interactive version available on the website (www.stateofthefuture.org) permits others to add ideas and comments. The report is laced with facts. For example:

- In 2006 the global economy grew 5.4 percent to $66 trillion while the population grew by 1.1 percent, increasing the average world per capita income by 4.3 percent
- 2 percent of people own 50 percent of the world's wealth while the poorest 50 percent own only 1 percent
- The income of the richest 225 people in the world equals that of the poorest 2.7 billion, or 40 percent of the global population
- More than half the world's 6.6 billion people live in urban areas.
- The prevalence of HIV/AIDS has begun to level off in Africa but it continues to spread rapidly in Eastern Europe and in Central and South Asia.

An abundance of detail

The abundance of detail is deliberate. "When people try to understand a lot of information, they try to simplify it and reduce it to the top two or three issues, but that is not doing the world a favor," said Glenn. "That's like saying the brain is more important than the respiratory system. Everything is interconnected and inter-related." And while people may argue one issue is more important than another, "the fact is that all are important," said Glenn. "What we are providing is utility. Most futurists consider single issues, like the World Bank looks at economics and the World Health Organization at health, but we provide a full range of issues and options."

The report is not a consensus document, but rather a distillation of input from the more than 2,400 policy makers, academics, futurists, and creative thinkers from all parts of the globe who have contributed to *State of the Future* reports over the past 11 years. As an agenda for the future, the work explores issues confronting the globe but it also shows solutions, said Glenn, updating information where necessary and adding new topics as research is completed. The Millennium Project conducts research under the auspices of the non-profit World Federation of United Nations Associations.

"This is the most vetted, longest lasting, cumulative integrated futures research project in history," said Glenn, "It is a mechanism for cumulative learning about future possibilities and what can be done, more like sculpting than writing for it changes all the time."

New for 2007

The 2007 version adds a futurist look at the possibilities for education and improving collective intelligence by 2030. It also updates the current status of the 15 global challenges and suggests ways these challenges can be met, both globally and in each region.

Another section, the State of the Future Index, SOFI, identifies where global humanity is winning and where it is losing, in effect providing a guide to where resources should be focused to improve prospects for the future.

Winners in 2007 include increases in life expectancy, decreasing infant mortality, increased literacy, fewer global conflicts, and increases in gross domestic products per capita and the number of global Internet users. The loss column cites increases in CO_2 emissions, terrorism, corruption, global warming, and unemployment, and a decrease in percentage of voting populations.

Introduced in 2001, the SOFI and its indicators have been refined each year, and now include a matrix and guidance to help individual countries develop their own SOFIs.

Special Research Projects

Over the years, a number of special research projects have been added. This year's addition, a study requested and supported by the Republic of Korea, explores possibilities for learning and education by 2030. Compiled by more than 200 participants, suggestions include greater use of individualized education, just-in-time knowledge and learning, use of simulations, improved individual nutrition, finding ways to keep adult brains healthier, E-Teaching, and integrated life-long learning systems.

Environmental security is another category. Using the Millennium Project definition of "environmental viability for life support with three sub-elements: preventing or repairing military damage to the environment, preventing or responding to environmentally caused conflicts, and protecting the environment due to its inherent moral value," contributors have identified more than 200 emerging international environmental security issues and suggested ways to address them. The potential audience is diverse and immense. "*State of the Future* provides a landscape from which people can draw information and ideas to suit and adapt to their unique needs," said Glenn. Public and private policy makers can use the information to improve strategic decision making and global understanding, corporations and business executives can use it for planning, professors and consultants find it useful for teaching and research.

What are the global challenges?

The report defines the fifteen global challenges as "transnational in nature and trans-institutional in solution. Any government or institution acting alone cannot address them." Further, it states, "All require collaborative action by governments, international organizations, corporations, universities, NGOs and creative individuals."

Despite the order, none is more or less important than any other, added Glenn. And they are interdependent. Progress toward one will affect others. So will deterioration.

Fifteen Global Challenges[2]

1. How can sustainable development be achieved for all?
2. How can everyone have sufficient clean water without conflict?
3. How can population growth and resources be brought into balance?
4. How can genuine democracy emerge from authoritarian regimes?
5. How can policy making be made more sensitive to global long-term perspectives?
6. How can the global convergence of information and communications technologies work for everyone?
7. How can ethical market economies be encouraged to help reduce the gap between rich and poor?
8. How can the threat of new and reemerging diseases and immune micro-organisms be reduced?
9. How can the capacity to decide be improved as the nature of work and institutions change?
10. How can shared values and new security strategies reduce ethnic conflicts, terrorism, and the use of weapons of mass destruction?
11. How can the changing status of women help improve the human condition?
12. How can transnational organized crime networks be stopped from becoming more powerful and sophisticated global enterprises?
13. How can growing energy demands be met safely and efficiently?
14. How can scientific and technological breakthroughs be accelerated to improve the human condition?
15. How can ethical considerations become more routinely incorporated into global decisions?

"Contributors spent years arguing and debating the most significant challenges confronting the global future before whittling the list down to fifteen," said Glenn. "We started with 280."

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[2] Two-minute videos on the fifteen global challenges: http://tinyurl.com/2fuupn
1. Sustainability (http://tinyurl.com/2mszrs) / Water (/37plmf) / 3. Population (/2tk9an) 4. Democracy (/2l72vu) / 5. Long-term (/2s279d) / 6. IT (/2wg3mz) 7. Ethical markets (/3ca6eg) / 8. Diseases (/2sv3p4) / 9 Decision (/2nqqe2) / 10 Terrorism (/2we9gk) / 11 Women (/3c8c8z) / 12 Crime (/32sbls) / 13. Energy (/2daa7j) 14. Scientific (/343are) / 15. Ethical Decision Making (http://tinyurl.com/2nqqe2)

Selective additional details

- People around the world are becoming healthier, wealthier, better educated, more peaceful, and increasingly connected and they are living longer, but at the same time the world is more corrupt, congested, warmer, and increasingly dangerous. Although the digital divide is beginning to close, income gaps are still expanding around the world and unemployment continues to grow.
- The global economy grew at 5.4% in 2006 to $66 trillion in Purchasing Power Parity (PPP). The population grew 1.1%, increasing the average world per capita income by 4.3%. At this rate world poverty will be cut by more than half between 2000 and 2015, meeting the UN Millennium Development Goal for poverty reduction except in sub-Saharan Africa. Although the majority of the world is improving economically, income disparities are still enormous: 2% of the world's richest people own more than 50% of the world's wealth, while the poorest 50% of people own 1%. And the income of the 225 richest people in the world is equal to that of the poorest 2.7 billion, 40% of the world.
- More than half the 6.6 billion people of the world live in urban environments. The foundations are being laid for cities to become augmented by *ubiquitous computing for collective intelligence* with just-in-time knowledge to better manage them. Nanosensors and transceivers in nearly everything will make it easier to manage a city as a whole—from transportation to security.
- Although great human tragedies like Iraq and Darfur dominate the news, the vast majority of the world is living in peace, conflicts actually decreased over the past decade, dialogues among differing worldviews are growing, intra-state conflicts are increasingly being settled by international interventions, and the number of refugees is falling. The number of African conflicts fell from a peak of 16 in 2002 to 5 in 2005.
- The prevalence of HIV/AIDS in Africa has begun to level off and could begin to actually decrease over the next few years. Meanwhile it continues to spread rapidly in Eastern Europe and in Central and South Asia. AIDS is the fourth leading cause of deaths in the world and the leading cause of death in sub-Saharan Africa.

- According to the World Health Organization (WHO), the world's average life expectancy is increasing from 48 years for those born in 1955 to 73 years for those who will be born in 2025. Global population is changing from high mortality and high fertility to low mortality and low fertility. Population may increase by another 2.8 billion by 2050 before it begins to fall, according to the UN's lower forecast, after which it could be 5.5 billion by 2100—which is 1 billion fewer people than are alive today. However, technological breakthroughs are likely to change these forecasts over the next 50 years, giving people even longer and more productive lives than most would believe possible today.
- According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), in 1970 about 37% of all people over the age of 15 were illiterate. That has fallen to less than 18% today. Between 1999 and 2004 the number of children without primary education fell by around 21 million to 77 million. The increasing and overwhelming evidence for global warming, the success of Al Gore's movie *An Inconvenient Truth*, and China's passing the United States in CO2 emissions have put global climate change among the top issues in the world today. The IPCC reported that CO2 emissions rose faster than its worst case scenario during 2000–04 and that without new government actions greenhouse gases will rise 25–90% over 2000 levels by 2030. The Secretary-General of the United Nations has called climate change a "defining issue of our era." U.S. Vice Adm. Richard H. Truly has said that global warming is a uniquely serious environmental security problem because it's not like "some hot spot we're trying to handle… It's going to happen to every country and every person in the whole world at the same time."
- There are increasing calls for an "Apollo-like" R&D program to solve the long-term problems of energy and climate change. The world should pressure the United States and China to create and lead a global strategy to create safer energy with fewer Green House Gas (GHG) emissions, which would reduce climate change and continue economic growth. Initial U.S.-China cooperation has begun on cleaner coal processing and biofuels. The energy alternatives to those that produce nuclear waste or CO2 emissions are proliferating. *The options to create and update global energy strategies seem too complex and rapidly changing for decision-makers to make coherent policy.* Yet the environmental and social consequences of

incoherent policy are so serious that a new global system for the identification, analysis, possible consequence assessment, and synthesis of energy options is justified. Such a system has to be designed so that it can be understood and used by the general public, politicians, and non-scientists, as well as by leading scientists and engineers around the world.

- By 2025, 1.8 billion people living in water scarce areas could become desperate enough to migrate in mass to other areas with equal concerns. We have to create more water, not just pricing policies to redistribute resources. Massive desalinization will be needed as well as seawater agriculture programs along 24,000 kilometers of desert coast lines to produce biofuels, food for humans and animals, and pulp for paper industries—all of which would free up fresh water for other purposes while absorbing CO2.

- According to Freedom House, the number of free countries grew from 46 to 90 over the past 30 years, accounting for 46% of the world's population, and for the past several years 64% of countries have been electoral democracies. Since democracies tend not to fight each other and since humanitarian crises are far more likely under authoritarian than democratic regimes, the trend toward democracy should lead to a more peaceful future among nation states. Unfortunately, massively destructive powers will be more available to individuals. Future desktop molecular and pharmaceutical manufacturing and organized crime's access to nuclear materials give single individuals the ability to make and use weapons of mass destruction—from biological weapons to low-level nuclear ("dirty") bombs.

- Transnational organized crime continues to grow in the absence of a comprehensive, integrated global counter strategy. Its total annual income could be well over $2 trillion, giving it more financial resources than all the military budgets worldwide. The 13–15 million AIDS orphans, with potentially another 10 million by 2010, constitute a gigantic pool of new talent for organized crime.

- According to the International Federation of the Red Cross and Red Crescent Societies, the total number of people affected by natural disasters has tripled over the past decade to 2 billion people, with the accumulated impact of natural disasters resulting in on average 211 million people directly affected each year. This is approximately five times the number of people thought to have been affected by conflict over the past decade.

Thinking together without ego: Collective intelligence as an evolutionary catalyst

Craig Hamilton and Claire Zammit[1]

Strategic thinking takes a quantum leap

Beyond the "wisdom of crowds"

We've all heard by now about the "wisdom of crowds"—the notion that the aggregated intelligence of any group is nearly always superior to the intelligence of any individual in that group. We know, for instance, that if a group of us average our guesses at the number of jelly beans in a jar, our "collective guess" will usually come closer to the mark than the best individual guess in the room. We know that this principle accounts for the wisdom that regulates markets, and that consistently returns good search results on Google.

Why, then, is it so often the case that when it comes to critical decision-making, thinking together as a small group tends to make us stupid rather than smart? Why do even our best attempts at collaboration often leave us secretly wishing for the simplicity and sharpness of outmoded "command and control" decision-making? With "groupthink" phenomena now well-studied, we know that primitive social drives for control, belonging and status can imperceptibly sabotage our collective pursuit of clarity. But, what prevents this knowledge

[1] Craig Hamilton and Claire Zammit are writers, educators, and strategic consultants. They work with organizations applying their principles of *evolutionary culture,* creating life-enhancing, growth-oriented workplaces, and achieving the adaptability and resilience that comes from paying careful attention to the collaborative environment. www.collective-intelligence.us.

from being integrated to the point that our collective intelligence is not only an aggregate phenomenon but a lived experience?

For those of us in positions of leadership whose success depends on our ability to tap the wisdom of our organizations and communities, the need to find a way out of this collective constipation is paramount. The following pages will explore an emerging paradigm which suggests some tangible methodologies for overcoming the social barriers to group intelligence, and ushering in a new era of collaborative thinking and collective creativity.

The Possibility

Imagine a group of people gathered for a creative strategy session with an unusual mandate. The entry fee for this conversation is that everyone has made a sincere and educated effort to check their "ego" at the door. With personal agendas temporarily set aside, there is a noticeable absence of self-consciousness, or self-concern of any kind. The familiar jockeying for position has vanished, and along with it, all approval seeking. No one seems invested in being right, appearing smart, or appearing any particular way at all. In the absence of these familiar negative social behaviors, there is simply an authentic, innocent, undefended interest in creatively engaging the task at hand. Without the familiar, primitive "mental noise" blocking the system, listening is deep and there is plenty of space for considered reflection.

Unified by a heartfelt and soulful commitment to a greater good, the group flows easily from one idea to the next. Diverging points of view are engaged organically, effortlessly, in the recognition that a diversity of perspectives represents a rich field of data to mine for insights. All questions and concerns are welcomed into the inquiry. Aware of the ever-looming specter of paralyzing group dynamics, an atmosphere of humility pervades, and an embodied knowledge that confronting the questions that challenge our deepest assumptions is our only safeguard against collective error.

Seeing Beyond the Self

The above scenario may sound like science fiction at worst, or wishful thinking at best. After all, most of us would be hard-pressed to point to a single example of a group we've participated in that bore any resemblance to this one. It is thus all the more significant to realize that the scenario described above was not derived from imagination, but from the lived experience of groups working to pioneer a new model for collective engagement.

As the above example suggests, at the heart of this new model is the conviction that the singular impediment to optimal group functioning is what has traditionally been known as "ego." Whether in the form of self-concern, self-aggrandizement, self-doubt, self-consciousness, self-infatuation, or self-absorption, this knot in the center of the psyche has long been recognized to be the lone obstacle to higher moral, spiritual and psychological development in individuals. But the recognition that this same unhealthy self-focus is the prime saboteur of higher collective functioning is a relatively new idea.

In part, this is a natural and expected progression. As organizations have begun to push the outer envelope of collaborative skill-building and collective functioning in general, it seemed only a matter of time before they would come up against the same challenge as those who have been working on individual development for centuries. But there is an element to this newfound discovery that is unique to the life conditions of our historical moment.

Confronted by an ever-growing array of global challenges, those at the leading edges of collective inquiry are recognizing the urgent need to pioneer new, more effective ways of thinking together about the big questions. In the midst of this urgency, there is a growing willingness to experiment with unorthodox approaches, including those arising from the time-tested spiritual psychologies of the East. As goal-oriented teams begin to apply the insights of meditation and inner cultivation to their collaborative pursuits, some surprising new possibilities are revealing themselves. Foremost among these is a collection of revolutionary social technologies that leverage positive group dynamics to catalyze trans-egoic creative collaboration among participants.

Understanding Ego: the Foundation

To begin to get a sense of how a group might be able to function beyond the grip of ego, it is first necessary to get clear what exactly we are trying to move beyond. Although the word "ego" is used in a variety of ways in contemporary culture, in this context we are using it to refer to something very specific. Within all of us, there is a primitive psychological and emotional drive for security and certainty. During our early evolution, it no doubt served countless important functions, but here in the 21st century, as we attempt to evolve our capacities for creativity and consciousness, this drive has developed into a pathology—a pathology of self-concern.

There is not sufficient space in this brief overview to elaborate in detail on the ego's many faces, but if we look at a typical group interaction, we can easily see its effect: If I am concerned about how I'm going to be perceived in the group, will I be willing to take a risk to challenge the group's assumptions? If I am driven by a need to establish my dominance over others, how interested will I be in hearing their points of view? If I am worried about how the group's decision is going to affect my own department, will I be available to explore all possibilities with an open mind? If I have an unrealistic sense of intellectual superiority, will I be willing to listen to ideas that challenge my own? If I am overly attached to a positive image of myself, will I be able to hear corrective feedback about my negative impact on others?

The list of the ego's undermining effects on group functioning is a long one, and those who have spent any time in collaborative environments could no doubt add many more to the few we have mentioned here. In the face of this seemingly ubiquitous obstacle to optimal collaboration, what then are we to do?

Drawing from our two decades of group facilitation and observation, we have put together a short list of core principles that begin to illuminate the contours of a new approach to high-level collaborative thinking. It is by no means comprehensive, but should give a snapshot of our best thinking on this to date.

Principles of Evolutionary Culture

1. **A Commitment to the Greater Good:** All of the individuals in the group must be genuinely committed to discovering and/or achieving the best possible outcome for the whole. Individual or departmental agendas must be set aside. Bringing the group to this high level of commitment may take considerable preparation, but is most easily achieved when all of those involved are on board with the organization's greater mission, and when there is a trust already established in the leadership's commitment to fairness.
2. **A Commitment to Wholehearted Engagement:** Each group member must be committed to fully participate in all group meetings. This means bringing one's full attention to the matter at hand, leaving all personal concerns at the door. By listening carefully to the contributions of others and putting their own

best thinking into the mix, each member contributes to the building of a larger vessel which can carry the group to unforeseen heights of insight.

3. **A Culture of Self-Responsibility:** All group members must feel personally responsible for the success of the group. Each must feel on a visceral level that the success of the group in achieving its outcomes rests on her shoulders alone. Given our natural tendency to defer responsibility, cultivating this level of ultimate personal responsibility among members of any group is a formidable task. One-on-one work with group members outside the group setting is usually necessary.

4. **A Suspension of Assumptions:** For the duration of the gathering, group members suspend everything they think they know in order to make room for new insights and understandings to emerge. Practicing what is known in Zen as a "beginner's mind," they cultivate an inner and outer environment of profound receptivity and openness, which turns out to be fertile soil for leaps in creativity.

5. **Culture of Deep Listening:** Group members aspire to listen to one another from a place deeper than intellect. They tune their ears to listen for the deepest threads and the emerging glimmers of novelty in each other's contributions, and, through their responses, they highlight and draw out those elements to make them transparent to the group.

6. **A Commitment to Authenticity:** Everyone in the group must be committed to speaking their mind and heart. This is built on the recognition that in order to make the best decision, the group needs everyone's data. To support this commitment, there must be an explicit agreement within the group that no point of view—no matter how challenging to either the leadership or to the group's assumptions—will be ridiculed or dismissed without genuine, respectful consideration.

7. **A Culture of Risk-Taking:** Nothing takes us to the edge of evolution faster than taking meaningful risks. This means speaking on an intuition when we're not sure we have the

words to give voice to it. Or, responding to a gut feeling that something isn't right, but doing so vulnerably, realizing that it might be oneself that's not right. It also means being willing to step into new ways of being, even if they feel frightening and unfamiliar. The more risk we are each willing to take, the more profound will be the group outcome.

8. **A Culture of Empowered Vulnerability:** Leading by example, the leadership demonstrates that it is okay to be vulnerable, to take the risk to expose one's ignorance and uncertainty. The group sees that such vulnerability is actually a position of strength and power because it shows a courageous willingness to step into the most insecure places. This leads to a healthy culture of non-avoidance that is the best inoculation against "groupthink."
9. **A Culture of Constant Resolution:** The group strives to maintain a clear and harmonious field of interaction between all participants. This means always striving to clear up any interpersonal tension as soon as possible, so as to build a container of deep harmony and trust among everyone. It is about leaving each interaction "without a trace." This can sometimes require additional processing outside the group meetings in order to keep group time most efficient.
10. **A Commitment to Grow and Evolve:** In order for the group to consistently function at an optimal level, all individuals must be committed to staying on their own "evolving edge," by seeking healthy feedback and taking on new challenges outside their comfort zone. When all of the individuals in a group are actively and enthusiastically engaged in their own evolution, their collective spirit of boundary-breaking infuses the group with vitality and organically keeps the group on its own evolving edge.

Conclusion

The possibility of a group thinking together beyond the grip of ego may seem like an unattainable goal to those with extensive experience of the pathologies of group life. But there is a growing body of action research demonstrating that,

through the dedicated application of the principles described above, this higher collective possibility can be made a reality.

Those pioneers who are willing to experiment in this arena will find many challenges along the way, but it is our conviction that the bounty of inspired collaboration and rich human engagement that awaits is well worth the effort.

Indeed, if human beings are going to rise to the challenge of our moment—that of coming together beyond our differences and giving birth to a cooperative and sustainable global village—finding a truly generative way to think together is a task that calls for the best from all of us.

The World Café: awakening collective intelligence and committed action

Juanita Brown, David Isaacs
and the
World Café Community[1]

Awakening & engaging Collective Intelligence through conversations about questions that matter.

Introduction

It is through our conversations that the stories of our future unfold, and never has that process been more critical. We now have the capacity, through neglect of the planetary commons on which our lives depend, to make this precious earth, our home, uninhabitable. We now have the capacity, through escalating violence and weapons of mass destruction, to make our precious human species, along with many others, extinct.

Yet this is also a moment of opportunity. We are connected as never before in webs of communication and information-sharing through the Internet and other media that make our collective predicament visible on a much larger scale than we could have imagined only a few years ago. And for the first time, we now have the capacity for engaging in connected global conversations and action about what is happening and how we choose to respond—conversations that are not under the formal aegis of any one institution, government, or corporation. It is time for us to engage in those conversations more intentionally. Our very survival as a human community, both locally and globally, may rest on our creative responses to the following questions:

[1] To learn more, visit http://en.wikipedia.org/wiki/The_World_Cafe.

- *How can we enhance our capacity to talk and think more deeply together about the critical issues facing our communities, our organizations, our nations and our planet?*
- *How can we access the mutual intelligence and wisdom we need to create innovative paths forward?*

The World Café: A Doorway to Collective Intelligence

The World Café is a simple, yet powerful conversational *process* for fostering constructive dialogue, accessing collective intelligence and creating innovative possibilities for action, particularly in groups that are larger than most traditional dialogue approaches are designed to accommodate. Since its inception in 1995, tens of thousands of people on six continents—including business, government, health, education, NGO, and multi-stakeholder groups– – have participated in World Café dialogues in settings ranging from crowded hotel ballrooms with 1200 people to cozy living rooms with just a dozen folks present.

Anyone interested in creating "conversations that matter" can engage the World Cafe approach, with its seven core design *principles* to improve people's collective capacity to share knowledge and shape the future together. World Cafe conversations simultaneously enable us to notice a deeper living *pattern* of connections at work in our organizations and communities—the often invisible webs of conversation and meaning making through which we already collectively shape the future, often in unintended ways.

Engaging the World Café *pattern, process, and principles* empowers leaders and others who work with groups to intentionally create dynamic networks of conversation and mutual intelligence around an organization's real work and critical questions.

How Does a World Café Dialogue Work?

Café conversations are designed on the assumption that people already have within them the wisdom and creativity to confront even the most difficult challenges. The process is simple, yet often yields surprising results. The innovative design of the World Café enables groups—often numbering

hundreds of people—to participate together in evolving rounds of dialogue with three or four others while at the same time remaining part of a single, larger, connected conversation. Small, intimate conversations link and build on each other as people move between groups, cross-pollinate ideas, and discover new insights around questions or issues that really matter to their life, work, or community. As the network of new connections increases, knowledge-sharing grows. A sense of the whole becomes increasingly visible. The collective wisdom of the group becomes more accessible, and innovative possibilities for action emerge.

In a Café gathering people often move rapidly from ordinary conversations—which keep us stuck in the past, are often divisive, and are generally superficial—toward "conversations that matter" in which it is possible to engage both collective intelligence and committed action in relation to a situation that people really care about. The seven World Cafe design principles, when used in combination, also create a kind of "conversational greenhouse," nurturing the conditions for the rapid propagation of actionable knowledge. These design principles are not limited to a formal Café event. They can also be used to focus and enhance the quality of other key conversations—enabling you to draw on the collective wisdom of an organization or community to a greater extent than generally occurs with more traditional approaches.

The World Café, both as a designed conversational process and as a deeper living systems pattern has immediate, practical implications for meeting and conference design, strategy formation, knowledge creation, rapid innovation, stakeholder engagement, and large-scale change. Experiencing a Café conversation in action also helps us make personal and professional choices about more satisfying ways to participate in the ongoing conversations that help shape our lives.

The Emergence of Wholeness

World Café hosts have commented on the excitement and energy that spirals upward as people and ideas move from one round of Café conversation to another, developing new connections and relationships. At times it feels as if the evolving rounds of conversation are sparking new synapses in the larger mind of the group as a whole.

The World Cafe intentionally connects the parts to the whole by combining the intimacy of a four- to five-person dialogue with the cross-pollination of ideas that occurs through radiating rounds of conversation. By encouraging people to carry forward the essential and/or most exciting ideas from their earlier conversations, the essence of the whole tends to become more visible as key ideas and insights travel rapidly through the conversational web. Café participants have described this experience as a "resonance of thought," "lighting up the system in the room," or "an accelerated evolutionary development of ideas."

We're especially intrigued by the lines of inquiry that the new sciences are revealing and the questions they raise for the theory and practice of dialogue. World Café conversations hold the promise of providing one intentional way not only to engage the fascinating network dynamics of emergence, but also to access—in their best moments—the unique relationship between the individual and the collective that enables a special type of mutual intelligence to emerge—the type of intelligence that the physicist David Bohm saw as the great promise of dialogue for our common future. Bohm described the type of awareness and holistic intelligence that emerges in authentic dialogue as occurring not only at the individual but simultaneously at the collective level. "It's a harmony of the individual and the collective," he said, "in which the whole constantly moves toward coherence" (1996, 27).

Our colleague, Tom Atlee (2003), describes the type of creative integration and higher-order thinking that occurs when diverse perspectives are engaged in dialogue as "co-intelligence." Co-intelligence is an apt description of the magic that World Café hosts and participants often describe when they reflect on their most productive Café dialogues. Mark Gerzon, the president of the Mediators Foundation, provides a poignant example of "the magic." While hosting a very challenging dialogue between Israeli Arabs and Jews, he recalls that "at the crucial mid-point, when the group seemed at an impasse, I suggested that we shift into a World Café process over dinner. The question was: 'What story can you tell that will help the others at your table understand your perspective on the conflict in Israel between Jews and Palestinians?' The stories were incredibly powerful, and the experience of consecutive storytelling with many different partners across the various fault lines fertilized the hard soil. The next morning, the breakthrough happened, I knew in my heart that the fertilizing

process of Café storytelling among all of the members was a key factor in making that breakthrough possible."

Kenoli Oleari, a community development specialist, describes the moment he had a similar experience in a large group Café conversation. "Something clicked for me about the World Café," he says. "I developed a visceral sense of what could come from the 'voice in the center of the room.' As the conversations wove themselves through the Café, shifting between various configurations of people and chemistries of interaction, I could feel how a sense of the whole—of something more than the assembled individuals—could grow. I was a bit awestruck by this epiphany."

Carolyn Baldwin, the former Assistant Area Superintendent of Schools in Polk County Florida, adds that the networked structure of the World Café enables the group "to have multiple eyes focused from different parts of a system on the same set of questions. Those eyes are literally moving around the questions with all their perspectives." "The wholeness" she explains, "comes from being able to see the system from many different angles." Connecting people and perspectives around core questions in ways that make seeing the whole more likely is what World Café learning is all about.

Designing for Emergence

The World Café process is not simply an interesting vehicle for the random emergence of collective intelligence. Rather, it embodies a simple but intentional architecture of engagement—creating the conditions for the arrival of serendipitous discoveries, new patterns of meaning, and the "voice in the center of the room"—especially in groups that are larger than most traditional dialogue circles.

But how does this actually work? Our conversations with physicist Fritjof Capra have shed light on this question. He points out that there's a natural tension between designed structures, like formal organizational charts, and emergent structures, like the informal ways work actually gets done in most organizations. Designed structures have pre-determined specifications; emergent structures often self-organize in ways that cannot be predicted. World Café conversations simultaneously engage both the intentional process of design and the natural process of emergence in order to encourage coherence without control.

In designing for emergence, all seven of the Café design principles work together to increase the likelihood (but never the certainty) of enlivening a generative and focused field of inquiry, where the magic of collective understanding and insight can be revealed.

However, it is the creative cross-pollination of people and ideas combined *with the disciplined use of questions as "attractors" that is perhaps the World Café's defining contribution to dialogic learning and collective intelligence.*

David Marsing, former senior executive at Intel, points out that carefully framed questions operate as attractors around which the web of cross-pollinating ideas evolves to create coherent patterns of meaning. In reflecting on how he believes this works, Marsing says, "You have the question sitting on the table as a starting point, but as people move in the rounds of dialogue, each person orients to the question in a different way. The connections grow fast with each rotation. You can imagine a three dimensional network forming, both in depth and breadth, around the original question. I would call it the focused development of a higher order of collective thinking around critical questions—it's co-emergence in action."

Seven Principles

1. Set the context: clarify your purpose: Ask "What conversation, if begun today, could ripple out in a way that creates new possibilities for the future of whatever you are presently exploring?" Determine the right participants: the diversity of the group matters; diverse views produce richer contributions. The intention of Cafe conversations is to collectively seek possibilities and share learning by mixing levels and perspectives. There is no pressure to expect immediate results; therefore, participants find themselves more able to share their best thinking around critical questions and to generate innovative possibilities for action.
2. Create a hospitable environment: think of ways to create a safe, inviting, life-serving and welcoming space. Smaller tables, for instance, facilitate more connection. Flowers, food and music might help a great deal.

3. Explore questions that matter: if you focus the collective attention on powerful questions that truly matter to those present, you will attract collaborative engagement.
4. Encourage everyone's contribution: with tables of four people, no one can "hide," so everyone is heard; respect each person present, and invite full participation and mutual giving.
5. Cross-pollinate and connect diverse perspectives: gather together people who will bring a wide range of perspectives and then retain a common focus on core questions.
6. Listen together for patterns, insights and deeper questions: Focus shared attention in ways that nurture coherence of thought without losing individual contributions.
7. Harvest and share collective discoveries: this can be done in various ways from writing on paper table cloths to having someone diagram collective ideas on the wall. However you choose to do it, including sitting in a larger circle later, invite the collective intelligence to emerge and make it visible as well as actionable and meaningful.

Forward Together

We look forward to continuing our exploration of both the World Café and of other doorways to collective intelligence and wise action at this critical time when the creation of a world at peace and our very survival together on this fragile and beautiful planet may depend on it.

Collective intelligence and the emergence of wholeness

Peggy Holman[1]

The trajectory of my life's work has been towards the liberation of the human spirit in the context of the whole, such that the good of the individual and the good of the collective are both well served. This embraces and reaches beyond concepts of "intelligence" and, in doing so, reframes intelligence—including collective intelligence—in terms that may better suit our 21st century challenges.

I see intelligence as having three dimensions:

- inquiring, exploring, and pattern-seeking
- learning, discovery, and pattern-naming
- knowing, answering, and pattern-providing

The products of "the intelligence community"—and much of the world of consultancy of which I have long been a part—involve the last of the three: Answers. We have information and understandings to share with those who need answers.

In this essay, I want to stress that there is much more to intelligence than that. I want to suggest that in times like ours, the quality and persistence of our

[1] Peggy Holman convenes conversations that matter using generative processes that call forth the best of who people are and can be to unleash the energy and wisdom to move dreams to action, resulting in more resilient, agile, collaborative and alive people and systems. The second edition of her book, *The Change Handbook* (Berrett-Koehler, 2007), has been warmly received as an aid to people in reinventing their organizations and communities. Peggy has an MBA from Seattle University. See www.opencirclecompany.com.

inquiry is as important—or more important—than any answers we may find. While "getting lost in exploration" can be a risk, given these times of rapid change, it is deadly to treat answers as if they are final.

Systems call forth different aspects of intelligence, as needed. When everything is working fine, people who have answers are rewarded and the pioneers and questioners are pushed to the fringe. When shifts begin to happen rapidly and systems begin failing, smart people and institutions start pulling in those who are effective at challenging the status quo and asking and pursuing powerful questions. What was fringe becomes central.

Intelligence is a CAPACITY that is particularly vital now. Our new century calls on us—both individually and collectively—to become artists at creatively challenging ourselves, each other, our organizations, and our social systems. It calls on us—in the face of uncertainty and dissonance—to use ART—to **A**SK questions, to deepen understanding by **R**EFLECTING the deep yearnings that we sense in others, and to **T**ELL STORIES that matter.

As the software development manager of a cellular phone company during the early days of the industry, I had a major project on the rocks. The company had just hired a director of Total Quality. He facilitated a meeting to determine how best to proceed. I had never seen a meeting dealing with a broad range of interests and personalities coupled with a complex subject so well handled. I thought, “If I knew more about how to do that, we’d be more effective at delivering systems.” Little did I know the path I had just stepped onto following! I took responsibility for transforming the Information Technologies group into a Total Quality organization. It was 1989 and while Total Quality was well entrenched in manufacturing, we broke new ground in a service organization. Much of our success was our focus on process using a highly systemic approach. Over the next three years, we changed every aspect of what we were doing. As part of the company wide effort, we became the best in the industry by every measure—customer satisfaction, employee satisfaction, operational excellence (including an award-winning data center).

At the end of that period, I thought I knew something about change. The next change effort I tried, I instantly fell on my face. That’s when my learning really took off. I was given the opportunity to find out what was happening on the leading edge of learning organizations for a 60,000 person company. It was 1993 and Peter Senge’s book, *The Fifth Discipline*, was the rage. During that period, I was introduced to some very exciting and innovative work that

engaged the people of the system in transforming their system. I was captivated. I had never before realized that it was not only possible but most effective when the good of the individual and the good of the collective are both served.

It was a turning point in my work. I became part of an emerging movement or field of study and practice which had no name, but in which tremendous knowledge of group and organizational capacity was emerging. In particular, we were developing increasingly sophisticated ways for engaging whole systems—all the stakeholders, all the parts of the organization or community—in shared exploration and creation of whatever happened next. In my pursuit to understand what made these practices effective, I was inspired to write my book, *The Change Handbook*, which in 1999 explored 18 methodologies for engaging whole systems.

I discovered that when these practices were most effective, they made room for individuals and the system to be and do together, connected through communication practices that not only informed the mind, but touched the heart. The latest 2007 version has expanded (as has the field) to include over 60 methodologies. The second edition sparked the "first annual" Nexus for Change[2] Conference: a convergence of practitioners, leaders, activists, and scholars committed to the power of participative change methods that transform whole organizations and communities as they face 21st Century challenges.

Through my experiences and research, I realized that not only were we learning how to engage whole systems, but we were learning how to engage whole humans—head, heart, body, spirit—and our whole diversity—of race, gender, age, class, perspective, etc.—and our whole range of intelligences and expressive modalities—logic, language, art, music, dance, story, imagination, etc.—and the whole complexity of the situations and inquiries we were exploring (the more viewpoints and possibilities we creatively included, the more fully we covered the ground). We were discovering how to address highly complex, often conflicted issues and bring forth breakthroughs.

This increasingly inclusive engagement of "the whole"—on all these fronts—proved both energizing and effective. I gravitated more and more to

[2] See www.nexusforchange.com for the continual unfolding of the inquiry around how these practices can serve the well-being of organizations, communities and social systems as a whole.

methodologies in which our answers were not the result of following a step-wise process, but were about creating contexts in which the people of the system gave birth to novel responses. These were the exciting fruits of—and stimulation for—ONGOING engagement of our full humanity with the fullness of our situation.

That kind of holistic engagement generated breakthroughs: new relationships, new communities, new projects, new possibilities, new understandings, and new forms of organizing ourselves to accomplish meaningful purpose.

I began to favor creative ways to engage with what we don't know, what we fear and dream of, what is just out of our reach, with all sorts of Mystery and Dissonance, rich with possibilities. I wanted to engage using our full selves, together, on the risky, vulnerable, juicy leading edge where new worlds emerge. I gravitated to approaches like Open Space Technology, Appreciative Inquiry, Dialogue, World Café, and the Art of Hosting.

My own edge right now reaches beyond all these methodologies. With passionate colleagues, I am exploring what makes these processes so powerful as stimulants for emergence.

Our goal is to break free of processes and methodologies, to touch the deeper patterns they reflect to convene and host even more powerful conversations that begin to connect us in community at increasing levels of scale.

Arising out of the dissonant, broken wholeness we see all around us, we have the potential to evolve into ever more life-serving wholeness for each and every one of us and the organizations, communities, and societies in which we live and work. At the heart of this exploration is EMERGENCE, that learning edge of evolution where useful, juicy novelty appears.

People who use emergent processes discover

- Wisdom within themselves;
- Connections to one another;
- Respect for their differences;
- Power through sharing stories; and
- Capacities for bringing dreams to life.

Keys to Emergence[3]

After years of witnessing remarkable transitions from fear, hopelessness, and conflict to renewal, commitment, and action, I perceived a pattern that provides a pathway from chaos to coherence. It has dramatically shifted how I do this work. Two catalytic actions start the process:

- Welcoming disturbances using powerful, life-affirming questions
- Inviting the diverse mix of people who care to explore the unknown.

Transformational change often begins with looming crisis, fear, conflict, and despair. This often creates a belief that any action, particularly when it involves complex issues and people in conflict, will lead to chaos, breakdown and a situation that is out of control.

What would it mean if the people involved could get curious about the unknown, to re-cast it through a lens of hope, dreams, desires and possibilities? While, either creates "disturbances" that indicate something new wants to emerge, the capacity to act increases dramatically when a glimmer of possibility shines through. Turmoil is a gateway to creativity and innovation. Just as seeds root in rich, dark soil, so does transformational change require the darkness of the **unknown**. Being receptive to not knowing takes courage.

Powerful Questions

Asking **unconditionally positive questions** at such times can overcome fear, uncertainty and doubt—questions like these World Café classics:

"What question, if answered, would serve us all well in this situation?"

"What could our community, our organization also be?"

They reframe problems as possibilities, focusing attention on what matters and bound the territory to explore, reducing the feeling of losing control. They also provide a powerful attractor for inviting the diverse mix of caring people

[3] You can read more about emergence in two articles on my website:
http://www.opencirclecompany.com/From Chaos to Coherence.pdf
http://www.opencirclecompany.com/DynamicsOfEmergence.pdf

into exploring the unknown. The greater the diversity, the more divergent the exploration is likely to be. The wider the divergence, the greater the possibility something unexpected will emerge.

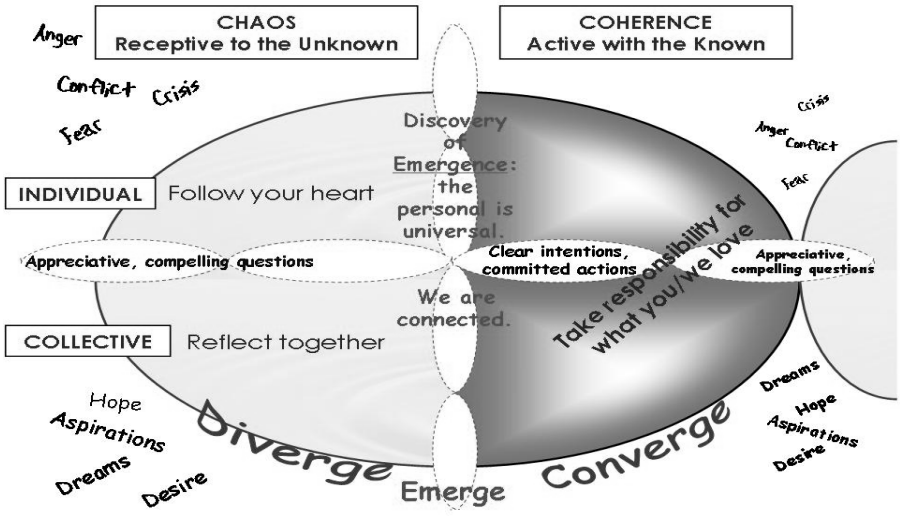


Figure 1. Emergence: Moving from Chaos to Coherence

Passion

Entering the unknown with appreciative questions liberates **individuals** and connects the **collective** to itself. Inviting people to **follow what has heart and meaning** elicits the unexpected. It is a remarkable gift, asking each person to look within their own place of mystery.

Furthermore, paradoxically, as people follow their own callings, a new sense of connection to each other surfaces, the group becomes more whole.

Differences seem less divisive, more beneficial. As the group collectively **reflects**, as they are witnesses for each other's stories, the connections to each other grow even stronger. And something more difficult to name begins to happen—the same ideas, themes, experiences, and inquiries begin to show up in widely diverse conversations.

These are the signals of **emergence**—the hidden tensions and coalescences that are finally surfacing into conscious awareness— recognizable because they show up and resonate so clearly in different parts of the same group. People sense a connection to something that defies description, a feeling of being part of a larger whole, a whole that is often much larger than the group itself. This felt sense of emergence has at its core the discovery that what is deeply **personal**, what means most to us individually is also **universal**. The discovery is palpable. The collective comes alive as new ideas and relationships emerge. We experience our **connection** to the "whole" filling us with excitement and energy, as a new coherent clarity emerges.

Personal and collective meaning **converge** into **coherent, clear intentions**. New ideas, insights, leaders, and structures naturally emerge. **Action** is often swift and effective. There is no need for consensus as clear intention focuses the field for action. There is no need to "enroll" others as people enroll themselves **taking responsibility for what they individually and collectively love**. The threads that connect people weave a powerful web of community. Ideas travel the web, sometimes achieving dramatic breakthroughs. Other times, changes surface months or years later as they travel the indirect pathways of new network connections. Parenthetically, this network frequently extends to those who didn't attend the event, who "catch" the spirit of the experience.

Emergent Conversations

Emergence! This is the stuff that new worlds are made of. The fact that it is so thrilling, so centered on what matters to us—to each and every one of us—is such a blessing from the universe! It is attraction to a purpose that calls to us, that has heart and meaning and draws us in. Once there, it is the magic of powerful conversational methodologies and high quality hosting or facilitation that can provide the environment for something useful to occur.

Generative conversations are clearly a forum for exercising collective intelligence in all its manifestations. But, perhaps more important, through iterations of powerful conversations, groups have the potential to move beyond collective intelligence to form “social organisms” that think, feel, sense, and operate through the unique capabilities of their members in loose-knit connection into a whole that is bound by commitment to common purpose. Knowledge of process, application of powerful conversational and whole-

systems methodologies, and further research and development to understand the nature of how emergent conversation can support us in growing resilient organizations and communities and to take such capacities to scale—these are critical factors, too often overlooked by busy actors in business, community-building, governance, activism, sustainability, and all other forms of proactive human engagement. It is time to change that.

The Challenge and the Potential of Emergent Practices

Perhaps the most common block to using emergent processes is that it is virtually impossible to know the specific forms outcomes will take. This is because, emergence, by definition, involves the unknown. What lessens the risk and increases the likelihood of success is the clarity of intention guiding the work.

This powerful combination—direction established with a question that focuses intention coupled with openness to the unknown—creates a dynamic tension ripe for emergence. While it can be a leap of faith to believe great results come without defining the specific outcomes, if you want breakthroughs, a broad and deep delving into passion and purpose almost always far exceeds any pre-determined outcomes. Those who ultimately choose this route often do so because they are stuck but realize that continuing to act in the same way won't produce the fundamentally re-generative results they seek.

The Evolution of What Emerges

A group's diversity, an event's duration, and ongoing experience shape the nature of what unfolds. In short homogenous events, new ideas, relationships, and connections can be made. Two days and increased diversity can generate breakthrough ideas pursued by self-organized teams. Longer events often provide glimpses of the ongoing pattern of emergent leadership and structures. With multiple experiences, the pattern is internalized, emergence becomes a practice, a part of the culture, and can even be institutionalized: Experiments in self-managed teams in organizations and citizen committees in communities frequently emerge. When embraced as an ongoing practice, people organize themselves following inspiration and commitment to form vital and robust communities of practice. Structures emerge to fit the context. New forms of

governance are required when leaders are those who attract followers by taking responsibility for what they love as an act of service to the well-being of the whole.

The more we develop the capacity for riding the waves of mystery that open to emergence, the more leadership emerges everywhere. Individuals, guided by their heads and hearts, act as "free agents." They speak from their full voices. When that voice resonates with others, as if some universal Truth were spoken, people follow. What IS a leader after all, but someone who speaks a truth so compellingly it inspires others to join them? When this opportunity is widely available, a powerful and fluid field of leadership emerges in the collective.

And when we collectively take responsibility for what we love, there is an unaccustomed openness in which our connections to each other form a "resonant network"; I and you become we. In truth, we are always connected. When we act from inner connection, we open to each other, and that connection is visible. In this web of community, people are more alive and effective, sharing their gifts with each other. They easily find others who care about the same things they do. The tension between the needs of each individual and the needs of the collective dissipate. We are in coherence. If one voice is dissonant, it no longer fragments the group. Instead, through attractive, appreciative questions and high-quality reflection, it is understood and integrated for the good of the whole.

When coherence is sustained, through continually tapping our sense of connection, the ripples are powerful. Newfound trust develops as breakthroughs in ideas, solutions, and relationships support both planned and emerging action. There is a greater willingness to be flexible. A virtuous cycle of ideas, connections and actions feed into even more exciting ideas, connections and actions.

So it seems to me that at its best, collective intelligence is always moving towards the verge, towards the edge of what we don't know. Collective intelligence doesn't stop working. The questions that are most alive are the ones that we don't yet have answers to. In the process of continually seeking answers to our questions together, we not only find answers, but find new means of seeking and new directions to explore, new questions to ask. This whole process is one of emergence. The trajectory is through continual differentiation and uniqueness (as we become more fully and visibly ourselves), through

continuous complexity and ordered patterns (as we discover coherences that take in more of reality), and through new ways of becoming aware, looking both inward and outward, into and beyond what first caught our attention.

The process carries us from our individual and collective assumptions, positions and certainties, through the actual complexity and mystery that we face, into new understandings and possibilities we never dreamed of, to embody more of The Whole. It is a journey from simplicity through complexity to a wiser, more whole simplicity on the other side. It is something that, ultimately, we can only do together, interacting, finding our wisdom emerging through the frictions between our differences and the pressure of what wants to be born working its way through everything we are and see, fully shared, as we awaken together into a new Common Sense—and then move on..

Knowledge creation in collective intelligence

Bruce LaDuke[1]

Intelligence

Definitions of intelligence across disciplines proposed to date are both broad and varied. They include concepts like judgment, application, problem-solving, adaptation, cognition, goal-setting, physical capacities, analysis, environmental response, and pattern-recognition. Artificial intelligence is simply an artificial capacity to have and/or execute intelligence. But what is intelligence?

The first issue to confront involving the definition of intelligence is whether or not intelligence is an umbrella term for several capacities of the mind or a standalone description of a single capacity of the mind. If intelligence is an umbrella term that encompasses many mental capacities, then we can only understand its definition by understanding the definitions of the component parts that comprise it.

If intelligence is a standalone description of a single capacity of the mind, then understanding that single capacity will make it plain. If the intelligence is both an umbrella term and a standalone term, then we need to be able to differentiate between these two.

Mental Faculties vs. Knowledge Interactions

If intelligence is defined in the context of mental faculties, we're looking at intelligence from the context of the individual as distinct from society. But to truly understand intelligence, we need to look at how the individual interacts

[1] Bruce LaDuke has 20 years of Fortune 500 experience in a broad range of roles and has conducted private interdisciplinary studies in knowledge working for most of his adult life. He is author of a blog on the future of knowledge working called HyperAdvance. http://www.hyperadvance.com.

with social knowledge. We need to understand intelligence in the context of social knowledge working.

Looking at intelligence in this way shows it as it truly is; a function of the human mind that interacts with the social mind. In the human experience, intelligence largely comes from without and not from within the human mind. In other words, intelligence is largely acquired from society, so to fully understand it; we need to understand human knowledge working and how the individual interacts with society in it. What are the components that comprise knowledge working on this level? I call these 'knowledge interactions' and have listed them below:

Individual Level

- Sensing—The acquisition of data from reality.
- Learning—The acquisition of existing knowledge.
- Ignorance—Purposefully ignoring knowledge.
- Knowledge creation—The creation of knowledge that has never existed before.
- Exposure—Society sensing or recognizing knowledge expressed by individuals.
- Expression and non-expression—The choice of the individual to express or not express their knowledge.
- Questions—The recognition of a lack of logical structure.
- Theory—Projected logical structure.

Social Level

- Instruction—The impartation of existing knowledge.
- Social Acceptance—The acceptance by society of individual knowledge
- Language design—The logical construct of language for a society.

Both Individual and Social Levels

- Consciousness—Self-awareness, sentience.

- Knowledge storage—The memory, recollection, and storage of knowledge.
- Compilation—The categorical structuring of knowledge.
- Collaboration—Group knowledge working
- Sharing—The free dissemination or mutual dissemination of knowledge.
- Connectivity—The physical vehicle or media for any form of knowledge transfer

Knowledge application is not a knowledge interaction. Knowledge is applied to create things within industry. Industry is the science of making things. It is important to differentiate between working knowledge and applying knowledge. Intelligence can exist without ever being applied, but intelligence is a requirement for any application to occur.

Knowledge Interaction Flows

Knowledge interactions are not linear. One interaction does not necessarily follow directly into another, but they rather interact with one another. To define intelligence accurately, the next step is to understand the flow of knowledge interactions from the individual to and from society. The following is a linear example of what is, in reality, a non-linear flow:

1. An individual is conscious and as such has awareness of his or her own existence within the environment.
2. The same individual learns a lingual construct from his or her society, and uses that language to learn knowledge. He or she learns by extracting knowledge from the social knowledge base, and then storing it in the biological brain.
3. This individual grows in knowledge to become an instructor and, using language, imparts knowledge from the social knowledge base to other learners, who store it in the biological brain.
4. The learner takes his or her knowledge gained and applies it to personal performance within industry.

5. This learner grows in knowledge to become a thought leader, using language, questions advanced concepts, creates knowledge, stores it in the biological brain, and expresses that knowledge to society.
6. Society accepts that knowledge, transfers it from the individual to society, and stores it in the social knowledge base where it is ready to be extracted by another individual through learning.

In reality, this process is not linear, but three-dimensional and interactive. Knowledge creation flows through social acceptance and into the social knowledge base, while learning flows out, typically through an instructor. And both are leveraged in industry, which uses knowledge to make things.

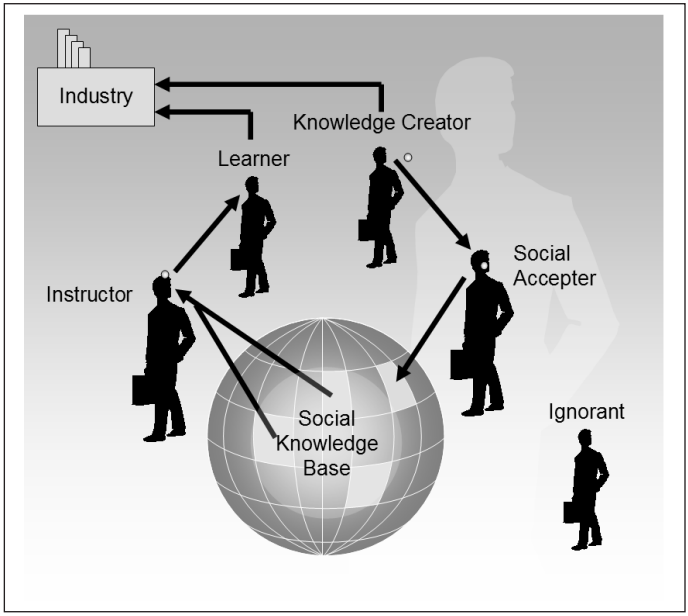


Figure 1: Collective Intelligence

The social knowledge base is comprised of science and technology. Science is converging empirical logic and associated with the discovery of reality. Technology is expanding rational logic and associated with creativity and invention.

Learners extract both science and technology and knowledge creators input both science and technology. And both science and technology are applied within industry.

Polanyi's Error

Michael Polanyi was a physicist turned philosopher who taught that "We know more than we are able to express." Much of modern knowledge management was founded on this erroneous premise. Much of the modern view of what knowledge working is, has been influenced by Polanyi's view.

Polanyi taught that some knowledge within individuals was 'tacit' or silent and difficult for that individual to express. Polanyi also taught that the key to knowledge working was to draw out this tacit knowledge from the minds of individuals.

The whole concept is very ill-defined and in terms of practical use and knowledge management has struggled within industry to apply it. Unfortunately, this premise will never be successfully applied because it is false. In reality, all knowledge can be expressed or it isn't really known.

And while knowledge is not difficult to express, it is the choice of the individual as to whether or not to express it. In this sense, knowledge can be tacit—Not because individuals don't know it or have difficulty expressing it, but rather because individuals choose to express or not express it.

Knowledge is a logical structure of concepts. Humans 'know' when they have stored logical structure in the brain and can recall it when needed or wanted. It is the area of the question, where logical structure is lacking, that humans find difficulty expressing what the mind contains. It is the question that Polanyi saw and attempted to describe.

Questions are also processed in the brain, but they are not stored as logical structure. Polanyi skipped over the question and this caused him to confuse the illogic of questions with the logic of knowledge. As others before him, and

those that followed after him did, he only saw knowledge, and ignored the question.

Knowledge Creation

Polanyi was brushing up against the process of knowledge creation, which is the conversion of questions (a recognized lack of logical structure) into knowledge (logical structure). Knowledge creation is the source of all knowledge and society cannot advance without it, but the process is almost entirely hidden or misconstrued in modern scholarship. Figure 2 shows how knowledge structure, questions, and the unknown interact with one another in a unified knowledge model.

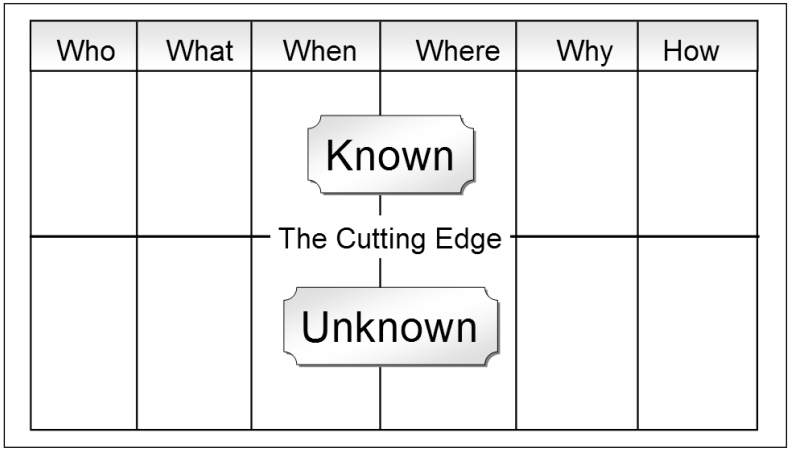


Figure 2: Directional Categorization

In Figure 3, who, what, when, where, why, and how represent all-encompassing categories for any problem.

Knowledge is one, and all knowledge can be categorized. Categorizing knowledge is structuring it. By placing the 'problem' into categorical structure we start to uncover questions of where our knowledge is not structured. The line between what we know, and questions and the unknown, is the cutting edge. By recognizing and structuring questions at this cutting edge, we are creating knowledge.

Creativity, creative problem solving, innovation, genius, creative methods, scientific method, and more can all be understood in the context of a simple and universal process of knowledge creation. This process is:

1. Definition/Solution/Structure (knowledge context)
2. Question/Problem
3. Logical Operation (connects/structures/defines)
4. Result: Advanced Definition/Solution/Structure
5. Return to step 1

Knowledge creation is the missing link in an accurate definition of intelligence and will prove to be the key to the implementation of true artificial 'intelligence.' Once we clearly see knowledge creation as it really is, the various roles of knowledge interactions, along with intelligence, become intuitively obvious.

On a final note, only individuals create new knowledge, not society has a whole. As such society is dependent on the individual expression of new knowledge for its own advance. If society wants to advance more quickly, the challenge isn't to try to find knowledge in individuals, but rather to reward individual knowledge creators for expressing new knowledge.

Clarity in Our Definition of Intelligence

With a deeper understanding of knowledge creation and collective knowledge interactions as a backdrop, let's dive deeper into the definition of intelligence. But before we can define what it is, we have to concede two primary things it is not:

- Intelligence it not knowledge creation and does not include knowledge creation. Knowledge creation is a totally distinct knowledge interaction.
- Intelligence is not the application of knowledge within industry and does not include this process. Industry utilizes intelligence from individuals to 'make things,' but intelligence can exist without application.

Mixing intelligence with other knowledge interactions or with the application of knowledge clouds it's definition. The following is a definition of intelligence that removes these aspects of knowledge creation and knowledge application and the result is quite simple:

Intelligence - Knowledge that is stored, and can be recalled, at the individual, group, or societal level.

Intelligence exists within the individual, within knowledge working groups, and within society as a whole. And intelligence is knowledge stored at any of these levels. Not knowledge made, goals reached, problems solved, or knowledge applied.

An individual in school 'learns' knowledge by transferring logical structure, often with the help of an instructor, from storage in the social knowledge base to storage in the individual intellect. By storing logical structure in the individual intellect, the individual becomes more intelligent. When people say things like "That child is intelligent," what they really mean is "That child has stored a lot of knowledge and can recall it."

Likewise, society becomes more intelligent when individual knowledge creators deliver new knowledge to society and it is accepted into the social knowledge base. By this process, society increases the amount of knowledge stored that can be recalled by individual learners and subsequently society becomes more intelligent.

Even though the individual and society become more intelligent by different processes that does not change what intelligence is. Intelligence is knowledge stored that can be recalled at any social level. Artificial 'Intelligence' is knowledge stored and recalled artificially at any social level. By this definition, mankind created artificial intelligence in the form of the standard computer system many years ago.

What researchers are really striving to discover is not artificial intelligence at all, but rather **artificial knowledge creation**. And the key to making this discovery is not found in knowledge or intelligence, but in the concept of the question.

Here are a few definitions that incorporate an accurate understanding of the role and capacity of questioning:

- Question—A recognized lack of logical structure.

- Brain—The individual, group or societal biological storage mechanism.
- Hard Drive—The individual, group, or societal technological storage mechanism.
- Knowledge—The logical structure of language and symbols chosen by a society.
- Learning—The transfer of knowledge from one storage capacity to any other at any level (between any combination of individual, group, or societies).
- Knowledge creation—The creation and retention of new knowledge at the individual level.
- Social acceptance - The acceptance of new knowledge, created and expressed to society by individuals, into broader social groups and/or the social knowledge base.
- And here are a few examples of fallacies that are corrected by an appropriate understanding of the question:
- Having a brain does not guarantee intelligence.
- The brain does not equal intelligence.
- A Global Brain is simply a global storage capacity, not a Global Intellect.
- The Global intellect is the amount of global knowledge stored that can be retrieved.
- Intelligence does not equal or include any facet of knowledge creation.
- An intelligent person may not be able to create knowledge. These are two distinct knowledge interactions.
- Learning takes knowledge out of the social knowledge base while knowledge creation puts it in.
- Learning increases individual intelligence and knowledge creation increases group and social intelligence.

- Intelligence is the result of social advance, not the cause. Knowledge creation is the cause of social advance.

The Sleeping Giant

The central theme of this paper is that intelligence and knowledge creation have been vastly confused and/or over-complicated at all levels of academia, industry, and society.

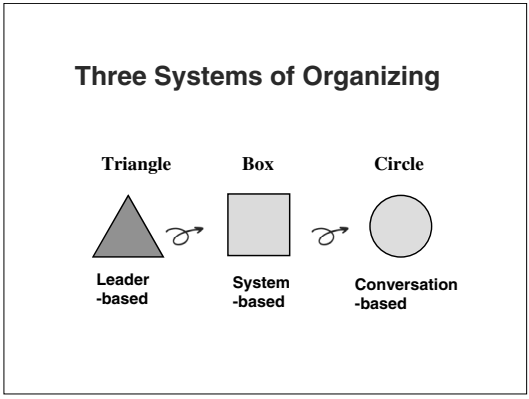
The true meaning of knowledge creation, which is the sleeping giant, lies dormant waiting to be discovered and accepted into our social knowledge base.

Knowledge creation can only be fully understood in understanding terms that describe facets of it. Terms like creativity, innovation, invention, or problem solving. All of these terms describe facets of one process—the recognition and logical structuring of questions.

The Circle Organization: Structuring for collective wisdom

Jim Rough[1]

The faculty of a Seattle high school was in bitter conflict. They had endured six different principals in seven years and the culture had devolved into low trust, fear, disrespect, anger, and childish behaviors. Many were expressing the desire for a principal to make decisions that would stick. Others wanted people to abide by votes that had already been taken.



A third group was wondering, "Why can't we just talk these issues through?" They wanted the ideal, where people work together in trust achieving excellence in a spirit of mutual appreciation. The school had recently received a substantial grant from a philanthropic foundation to transform itself to a process of participative decision-making. But the grant became part of the problem when those on the committee were paid overtime while other teachers on other committees were not. The union became involved, advocating that everyone should be paid for any activity after school, which was impossible. So the effort at transformation was making things worse.

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Three Systems

This situation illustrates three different approaches to achieving collective intelligence within schools, corporations, hospitals, government agencies, or human societies in general. The three approaches are: 1) the Triangle, based on hierarchy and positional authority where a leader is ultimately in charge; 2) the Box, where a prescribed set of agreements like a constitution is ultimately in charge; and 3) the Circle, where a creative conversation of everyone is the ultimate authority. At heart, most people desire the Circle system, where employees, students, citizens, or organizational members share a common aim, are deeply involved with one another, where their best talents and skills are evoked, and where results are exceptional. This is true democracy. But the Circle is difficult to achieve. In fact, many people actively avoid it because previous efforts to achieve it have been painful and made things worse.

Each of the three systems has a different underlying structure, promotes a different attitude, requires different leadership competencies, and generates different results, which in the high school includes student learning.

Military organizations and those with charismatic leaders are Triangles in which status and rank predominate. Government agencies and schools are Boxes where the entrepreneurial spirit is both evoked and limited by a clear set of rules. For unions, business cooperatives, membership organizations, and democracies, the Circle seems appropriate because the people own the system equally. But in practice, these organizations are often rigid Boxes or Triangles because the Circle has proven impossible to achieve. Surprisingly, corporations are often most capable of achieving a Circle. But publicly traded corporations eventually retreat to the Box because their bottom line is profit, not the pursuit of shared values.

A new principal has come to Seattle's high school. If his personal style is Triangle he will seek to exert hands-on leadership and make the decisions. If it's the Box, he might exert hands-off leadership by establishing clear goals for each department with measures and boundaries, permitting teachers to do their jobs within a range of freedom. However, the stated aim of the school board is the Circle. So he is expected to overcome the Box nature of his situation with facilitative leadership. To do this he must assure a particular quality of conversation throughout the organization. Plus, he must assure that each person in the organization is a willing participant.

The Conversation

Each of the three systems generates a different kind of conversation. The Triangle teaches deference to the leader. People learn to suppress their own ideas and enthusiasm in favor of what the leader thinks and feels. The conversation revolves around who is speaking rather than the merit of ideas. To make a difference in this organization one must influence the leaders or gain status with them.

'Choice-creating'

…where people address a difficult problem authentically and creatively, seeking a solution that works for all.

Ideally, the Box conversation is a puzzle-solving process where people analyze the situation, define the problem, deliberate on which idea is best, and make decisions based on objective data. However, since people are often driven by their feelings problems rarely present themselves cleanly in this way. So the Box conversation is often a competitive back and forth discussion or debate. People seek to stay rational, which is the aim of the Box, so they suppress their feelings and avoid addressing the big, seemingly impossible issues. Like players in a game, they limit their attention to the score and staying within the boundaries.

Choice-creating

The Circle requires a form of conversation where people drop their roles and become authentic, face the big seemingly unsolvable issues collaboratively and creatively, and reach unanimous perspectives. It's a paradoxical form of conversation because each person becomes more unique while at the same time he or she feels more connected as one. This happens naturally when people face a difficult problem and achieve a breakthrough. Then the result is unanimous and better than what anyone had imagined. Each person grows from the experience and all feel a new sense of unity.

This quality of talking is unique. It is similar to dialogue, but unlike dialogue it generates group conclusions. It is also similar to but different from

decision-making, consensus-building, discussion, debate, negotiation, deliberation, problem-solving, and creative problem-solving. I call this Circle form of conversation "*choice-creating"*.

Choice-creating is when people address a problem they care about creatively and collaboratively seeking solutions that work for all. While choice-creating is creative it's not brainstorming, where people stay in their roles, address issues about which they are emotionally detached, generate ideas off the top of their heads and then decide which one to do. In choice-creating people express themselves in a heartfelt way and what to do just emerges. In this kind of conversation, if a person or ideas are judged, it can be deeply hurtful.

The movie *Dead Poet's Society* provides a dramatic illustration. A teacher (played by Robin Williams) comes to a boys' school and evokes real passion for learning. He enlivens creativity and enthusiasm for poetry such that his students no longer follow the prescribed curriculum. They quest after the true spirit of poetry, following the muse inside them. To parents and administrators rooted in the Box system, such empowering changes in the students threaten a loss of control. So they re-impose the Box curriculum.

One student in the class had felt such a deep opening in his life that in this emotionally vulnerable state he commits suicide rather than return to his repressed inside-the-Box existence. The administration blames the facilitative teacher and the other teachers become more alert than ever to the dangers of releasing heartfelt creativity in students.

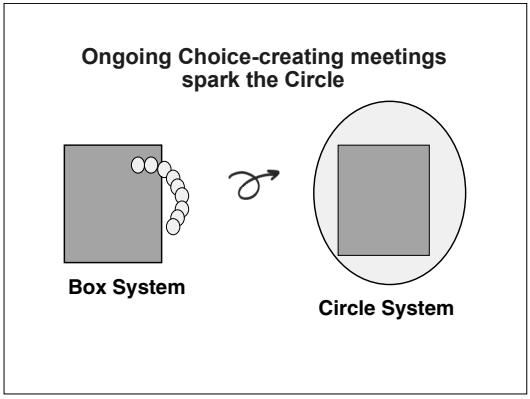
Many organizations have enacted elements of this story. Once upon a time they experimented with the Circle system beginning the heartfelt creative conversation. They did not understand the vulnerability that comes with releasing creativity, and didn't adequately protect people from judgment. Today these organizations often have a core group of people who adamantly say, "Never again!" Now jaded, they resist all change, especially if it seems "touchy-feely."

So how might the new Seattle high school principal safely transform the school to the Circle system when the structure is a Box where judgment is lurking, and there is a core group of people actively resisting new approaches? A similar question might be asked of us: How might we safely transform our organizations and our society so that we come together in respect, face the big

impossible-seeming issues, and creatively determine solutions that work for everyone? … and where there is lots of resistance to change?

Besides establishing choice-creating as the form of conversation we must also assure that this conversation will be ongoing. English consultant Dennis Martin was able to design this into a new pharmaceutical plant in Ireland. Now many years later it is the culture. Major decisions in that plant are made by employee teams or through large group meetings and each person participates. Now a different transnational corporation has acquired this plant. They recognize the immense benefits of this approach and the dangers of contaminating it with their normal management style. So they keep this plant and these employees isolated from the rest of their operations. No one wants to undermine the Circle System once it's established, but interestingly they also don't seek to extend this style throughout the company.

Another approach is through a form of facilitative leadership exemplified by CEO Jack Rooney at U.S. Cellular. With the aid of an internal consulting group he assures ongoing choice-creating conversations among managers. About once a month managers meet in day-long leadership development retreats. This unusually large investment of management time promotes a Circle style throughout the organization.



The ongoing choice-creating conversation that involves everyone quietly becomes the primary mode of "decision-making" in the organization. This form of talking and thinking empowers people as individuals and evokes the emergence of "We the People," everyone working together toward the same end. Dynamic Facilitation is a way by which one person can assure this high quality of thinking in a small group. The "Wisdom Council" extends the range of Dynamic Facilitation so that a very large system of people can be in one choice-creating conversation.

Dynamic Facilitation

The dynamic facilitator helps people address issues important to them regardless of how impossible they might seem. Instead of asking people to only work on what is possible, adhere to guidelines or to restrain themselves in some way, the dynamic facilitator welcomes participants as they are. Each person expresses him or her self naturally, while the dynamic facilitator assures that every expression is received as an important contribution to the group.

She or he uses four charts—Solutions, Data, Concerns, and Problem-Statements—to help all hear one another fully without judgment. For example, if someone starts to disagree with an idea, the facilitator invites that person to direct the comment directly to her, rather than to the person with whom he is disagreeing. Then she records the comment as a concern to be added to the list of Concerns, and invites the person to offer an alternate solution, which is added to the list of Solutions. This approach avoids judgment. There is no agree/disagree discussion. Each person is honored. Each comment is an asset to the group and people are creative together. Shifts and breakthroughs naturally result.

Meetings in the Department of Public Works in Jefferson County, Washington are dynamically facilitated. This allows the manager, Frank Gifford, to be a full participant in the conversations and gives him greater flexibility as leader. Each person contributes to managing the organization and results are exceptional.

Once I dynamically facilitated employees of a sawmill over a period of years. They turned their frustrations into thoughtful actions and dramatically improved the functioning of the mill. In the early stages management wasn't involved in the meetings, but were surprised by unforeseen leaps in productivity and quality. Just by participating in a conversation where they talked about problems important to them, mill workers became more cooperative, curious, informed, and observant in their work. They trusted more, risked more, and began to understand the intricacies of their workplace. They invented new solutions to seemingly impossible problems and generated a spirit of community in the mill. As a group they approached both the union and management, enabling them to cooperate on new training programs and dramatically reducing discipline issues.

The Wisdom Council

The best way to facilitate a transformation to the Circle is for there to be *one* overarching, ongoing choice-creating conversation as well as many small group conversations. This one conversation is made more difficult when the system is large, like for a corporation, city or nation, or when people have different schedules or locations. The Wisdom Council is a new strategy to overcome these difficulties.

In a Wisdom Council, every four months eight to twelve people are randomly selected as a microcosm of the organization. This small group meets for a couple of days with a dynamic facilitator. They choose big issues to address and reach unanimous conclusions. Then the Wisdom Council presents these conclusions and the story of how they were developed to everyone. Then all the people are invited to talk face-to-face in small groups, or over the telephone or via the Internet. Those that hear the story generally agree, feel involved and continue the conversation. Largely because of the nature of choice-creating, people in the greater audience feel resonant with the process. If one person differs with the Wisdom Council conclusions, all are interested to know why. They listen carefully and seek ways to incorporate this divergent view. This inclusiveness is unlike the normal political conversation where people argue, exclude, and try to mute differences. In the Wisdom Council process, people value different perspectives as a way to achieve unanimity and to make the current solutions better.

At one elementary school, a group of parents decided they were tired of the usual adversarial process of decision-making and implemented a year-long Wisdom Council among themselves. This conversation among parents generated more volunteers, developed greater understanding, produced a new parent guidebook, and demonstrated support for the faculty and administration. The principal, who was rooted in the leadership style of the Triangle, was not supportive, so it was dropped after a year. Later however, people began acknowledging the many positive changes, so they began it again. This time the principal and faculty embraced it.

Three ordinary citizens in Ashland, Oregon experimented with one Wisdom Council for their county. They arranged for a randomly selected group of registered voters to come together for a day and a half and be dynamically facilitated. The Wisdom Council presented its conclusions to a gathering of the community. The council said that “We the People” need to awaken from our

slumber, take charge of our society, make politicians more accountable, and start implementing common-sense policies, like adequately funding education. It was just a one-time experiment but important developments resulted. A number of Wisdom Council participants said that the experience was life changing and many began a citizens' movement to rewrite the town charter.

In the Department of Agriculture of Washington State, many employees lamented that their division no longer had the spirit of community it once had. They initiated a Wisdom Council process within the division and found themselves reconnecting with one another and their vital mission. Later the process was expanded to include the whole department, where for the first time many said they had finally bridged the "Cascade Mountain Barrier," which had always kept the agency in two separate cultures.

Summary

There are three fundamental ways to structure collective intelligence for a system of people: the Triangle, Box and Circle. The Triangle is where someone is in charge; the Box is where a system is in charge; and the Circle is where everyone comes together into a "we," and we are in charge. Throughout history the Circle has been most desirable and most beneficial but largely unattainable. Now, as a society, we are facing collective problems that a Box system on automatic pilot cannot handle. We must take charge. But how?

Key to making the shift to the Circle system is to distinguish a particular type of talking and thinking called *choice-creating*. Choice-creating is where people collaboratively address the most important issues and creatively seek solutions that work for all. Unlike decision-making, choice-creating requires an environment where people can be authentic, heartfelt and creative, that is safe from judgment. Dynamic Facilitation can assure this environment and this quality of thinking in small groups. The Wisdom Council can assure it throughout a large system, so all can be involved in one ongoing choice-creating conversation. Because the Wisdom Council process can be applied to very large systems like corporations, cities, and nations, because it can be initiated by people low on the hierarchy, and because it safely builds on what is already there, it offers exciting new prospects for collective wisdom.

Civic intelligence and the public sphere

Douglas Schuler[1]

Although I didn't realize it until relatively recently, I've been working in the field of "civic intelligence" for over twenty years. Civic intelligence is the ability of groups and organizations and, ideally, society *as a whole* to conceive and implement effective, equitable, and sustainable approaches to shared problems. I've organized ten "big tent" conferences that encouraged people to work together on shared concerns and I am a co-founder of the Seattle Community Network, an influential, free public-access, community-oriented computer network that provided free e-mail years before Hotmail and Gmail were created. Recently I worked with over 200 authors on an online and print "pattern language" project to present a holistic system of 136 "patterns" of thought and action that pushes for positive social change. This work (including 9 contextual chapters) will be published in 2008 by MIT Press as *Liberating Voices: A Pattern Language for Communications Revolution*.

I would characterize all of this work as *meliorist*. This means that it is neither *optimistic*, where good things are always expected, or *pessimistic* where bad things are always expected. A meliorist stance allows for the *possibility* of good happening in the world. It places the burden on humankind who, within this conceptual framework, has some capability, whether employed or not, of ushering in positive outcomes while slowing down or preventing negative ones. Meliorism is both weak—in the sense that it only allows for the possibility of possibility of change—and strong—since it ultimately demands that humankind takes a good share of the blame for the past and responsibility for the future. Although not often embraced as an orienting concept, meliorism is a doctrine that is hopeful yet skeptical, utopian but practical.

[1] Douglas Schuler is a Member of the Faculty (Evening and Weekend Studies) at The Evergreen State College (http://www.evergreen.edu) and president of the Public Sphere Project (http://www.publicsphereproject.org/).

Civic intelligence is very similar to John Dewey's "cooperative intelligence" or the "democratic faith" that asserts that "each individual has something to contribute, and the value of each contribution can be assessed only as it entered into the final pooled intelligence constituted by the contributions of all." Civic intelligence is implicitly invoked by the subtitle of Jared Diamond's recent book, *Collapse: Why Some Societies Choose to Fail or Succeed* (2004) and to the question posed in Thomas Homer-Dixon's book *Ingenuity Gap: How Can We Solve the Problems of the Future?* (2000) that suggests that we'll need humankind's ingenuity in the near future if we are to stave off problems related to climate change and other potentially catastrophic occurrences.

Robert Putnam, who is largely responsible for the widespread consideration of "social capital" (2000), has written that *social* innovation often occurs in response to social needs. This certainly squares with George Basalla's findings related to *technological* innovation (1988), which simultaneously facilitates and responds to social innovation. The concept of "civic intelligence," certainly an example of social innovation, is a response to a perceived need and the reception that it receives or doesn't receive will be in proportion to its perceived need by others.

Figure 1: Friends of Nature working on "Green Map"

No atlas of civic intelligence exists, yet the quantity and quality of examples worldwide is enormous. While a comprehensive "atlas" is not our goal, we are currently developing online resources to record at least some small percentage of these efforts. The rise in the number of transnational advocacy networks, the coordinated worldwide demonstrations protesting the invasion of Iraq, and the World Social Forums that provided "free space" for thousands of activists from around the world, all support the idea that civic intelligence is growing. Although smaller in scope, efforts like the work of the Friends of Nature group (Fig. 1) to create a "Green Map" of Beijing (Fig. 2) are also notable.

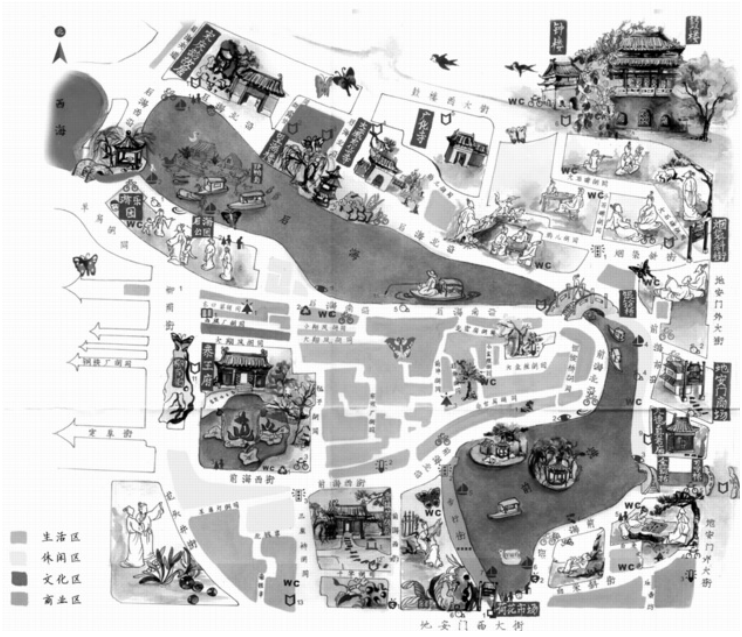


Figure 2: Beijing "Green Map"

Civic intelligence is inherently multi-disciplinary and open-ended. Cognitive scientists address some of these issues in the study of "distributed cognition." Social scientists study aspects of it with their work on group dynamics, democratic theory, on social systems generally, and in many other subfields. The concept is important in business literature ("organizational

learning") and in the study of "epistemic communities" (scientific research communities, notably). The Evergreen State College, where I teach is an educational institution that consciously integrates theory and practice and focuses on interdisciplinary learning and teaching, and as such, is strongly involved in the theory and practice of civic intelligence, without of course employing the term explicitly — at least historically.

Civic intelligence focuses on the role of civil society and the public. We do this for several reasons. At a minimum, the public's input is necessary to ratify important decisions made by business or government. Beyond that, however, civil society has originated and provided the leadership for a number of vital social movements. Moreover, civil society is underfunded and rarely receives the attention it deserves. And since it doesn't always have "an axe to grind" as government or business entities often do, it is more likely to be a honest broker of social initiatives.

Any inquiry into the nature of civic intelligence must be collaborative and participatory. For this reason we're working to involve others in this inquiry at the same time I'm developing my own theories, uncovering corroborating evidence, etc. To this end I've developed two basic, preliminary models, a descriptive one and a functional one. The descriptive model which contains six aspects of civic intelligence and is intended to assist this work in two ways: (1) to help identify examples of civic intelligence; and (2) to help identify pertinent aspects of those examples for analysis, comparison, and use. The functional model (depicted graphically using the SeeMe modeling methodology [Herrmann et al, 2004], Fig. 3) is intended to actually portray the functional aspects of civic intelligence. One of the most important future steps will be identifying a variety of actual "mechanisms" which help undergird and assist in the actual processes. The functional model in particular combines and builds on existing models of human learning and models of social change. And although I am wary of settling prematurely on one approach, this approach seems promising. It is difficult to envision either human learning or social change occurring without the other occurring as well. Moreover, focusing on models based on these aspects explicitly encourages and builds on the work in various disciplines.

The descriptive model of civic intelligence contains six aspects:

1. ***Orientation*** describes the purpose, principles and perspectives that help energize an effective deployment of civic intelligence.
2. ***Organization*** refers to the structures, methods and roles by which people engage in civic intelligence.
3. ***Engagement*** refers to the ways in which civic intelligence is an active and *provocative* force for thought, action, and social change.
4. ***Intelligence*** refers to the ways that civic intelligence is manifested through learning, knowledge formulation and sharing, interpretation, planning, metacognition, etc.
5. ***Products and Projects*** refers to some of the ways, both long-term and incremental, that civic intelligence organizations focus their efforts. This includes tangible outcomes and campaigns to help attain desired objectives.
6. ***Resources*** refers to the types of support that people and institutions engaged in civic intelligence work need and use. (The resources that these people and organizations create and provide would be discussed in the *Products and Projects* section above.)

The functional model contains three main components and eight interaction process types. The three main functional components are:

1. The ***internal component*** (often an organization) that is being considered;
2. The ***environment*** (basically everything "outside" of the internal component that affects it and everything that the internal component attends to that isn't "within" it); and
3. The ***core model*** that contains the knowledge, formal and informal, tacit and explicit, human- and artifact-based, that guides the thinking and actions of the organization.

The "core model" corresponds to the "mental model" of the organization (or other entity) and it is analogous to the "mental model" in humans (Bransford et al, 1999).

We have identified four primary means through which the internal component (often an organization) interacts with the external world:

1. ***Monitoring.*** This describes how the organization acquires new relevant information non-intrusively. It includes how organizations develop and implement their information seeking and selection techniques.
2. ***Discussion and deliberation.*** This describes how organizations (including "virtual" organizations like public policy networks) discuss issues and determine common agendas, "issue frames" (Keck and Sikkink, 1998) and action plans with other entities. The internal component (and its core) of any participants of these interactions can change as a result of the interactions.
3. ***Engagement.*** This is how the organization attempts to make changes in the world. This can be done with varying degrees of cooperation and combativeness
4. ***Resource transfer.*** This describes how non-informational resources like volunteers and money are acquired from outside.

We have identified four primary means through which the core component interacts with the remainder of the component:

1. ***Interpretation of new information.*** This describes how new information is considered and how it ultimately becomes (or doesn't become) part of the core. New information can also be information about the organization.
2. ***Maintaining core model*** (includes resource management). This describes the actions that the internal component consciously and unconsciously undertakes to preserve the viability of its core model.
3. ***Planning and plan execution.*** This basically describes how tasks and plans are initiated, carried out, and monitored.
4. ***Modification of core model.*** This is basically a reflective exercise where the core itself is examined by participants in the organization and modified.

Note that the eight interaction process types described take place simultaneously, often in relation to each other and apply a variety of approaches within a single type. As mentioned above, we intend to examine each of these

more closely and refine as necessary based on research findings and existing examples.

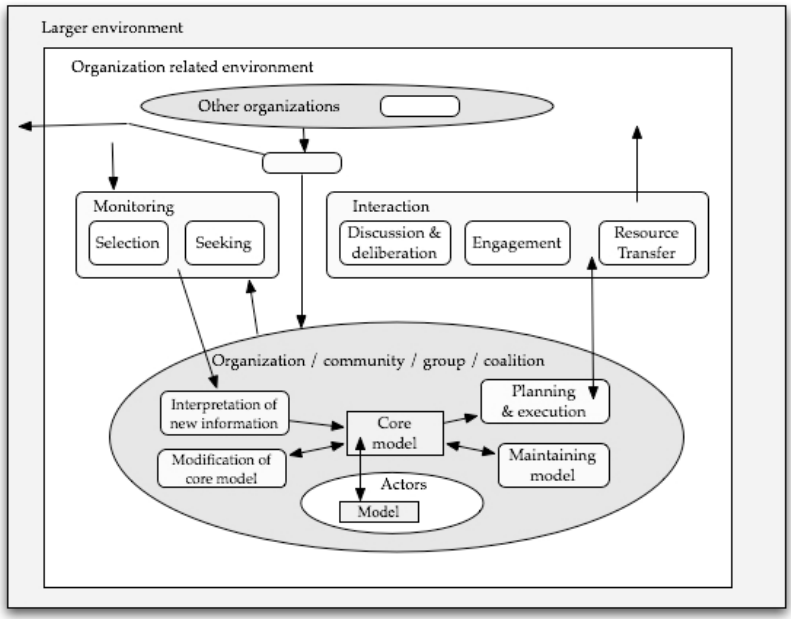


Figure 3: Civic Intelligence Functional Model

We will be engaged in three basic activities over the next several years:

1. Critiquing and refining the civic intelligence concept (including the models);
2. Using the concept as an analytic tool to evaluate projects and communities (geographic and of practice); and
3. Using the concept as an orienting framework for information and communication in relation to civil society and social innovation and developing additional online resources in support of that.

We note that there are three perspectives on civic intelligence and each perspective, although complementary with the others, engages a different

principal community and employs slightly different orientations and modus operandi. These perspectives include:

1. ***civic intelligence as social science*** ("Let's understand it");
2. ***civic intelligence as organizational analysis and self-reflection*** ("Let's use it") and
3. ***civic intelligence as a social movement*** ("Let's do it").

Each perspective is related to the general concept (and to each other) but each has different goals, activities, strategies, norms, social actors, resources, and slogans.

Liberating Voices

Although information and communication systems continue to link people from all over the world into a closer web, at the same time they are failing to meet society's complex needs in significant ways. These needs include the basic needs that all people share — the right to communicate, the right to seek out information for educational and other needs without hindrance, and other individual needs. Beyond that there are collective needs as well, for people rarely accomplish anything by themselves. We believe that the civic sector has a critical role, that it is now playing to develop systems that substantially aid humankind in addressing the severe problems that in large part are caused or exacerbated by the technological and social systems of the modern world.

The *Liberating Voices* pattern language is an online resource (and, as of Spring 2008, a book) for researchers, activists, and others who are interested in developing these information and communication systems. This work is part of a long-range project to craft a useful, compelling and comprehensive collection of knowledge which reflects the wisdom of people from all over the world who are developing information and communication systems that support humankind's deepest core values.

The concept of "pattern language" comes from University of California, Berkeley, architect, Christopher Alexander and his colleagues and was developed for use in architectural and urban planning. Their ideas have been applied in numerous other settings and disciplines including object-oriented programming, ecological design, and human computer interactions. A pattern language can also reveal how to ensure that the *Information Society* will be a *Civil Societ*y as well.

Launched with funding from the (US) National Science Foundation (NSF) at the 2002 eighth biannual Computer Professionals for Social Responsibility's symposium on the social implications of computing "Shaping the Network Society: Patterns for Participation, Action, and Change," hundreds of participants from around the world began to describe a pattern language of civil society for information society. The project has been collecting and integrating a diverse collection of "patterns" about the information society into a coherent and compelling "knowledge structure" which reflects the wisdom of a worldwide community. A pattern is a "semi-structured" chunk of information whose primary fields include problem, context, discussion, solution, and links to other patterns. The hypothesis was that the structured nature of the patterns will promote their integration into a coherent, interlinked pattern language that is more than the sum of its parts.

This long-term project employs a number of open-ended participatory techniques using online and face-to-face venues. Over 400 patterns have been submitted via the online pattern management system.[2] Over 120 authors from approximately twenty countries have participated. Although we are still accepting patterns in the patterns in progress "pool" we have completed a pattern language consisting of 136 patterns covering a very wide field. Each pattern is "linked" to others that are likely to be used in conjunction with that pattern.

With the publication of the book we hope that people and organizations will consult and apply the patterns to help them attain their goals. This experience should help us evaluate and refine them for future use. At the same time we will be improving our online resources and methodology. Justin Smith is now working with colleagues at Washington State University and other institutions to develop useful and easy-to-use graphic interfaces to the patterns and the pattern language.

The Public Sphere Project

The "Public Sphere" is a concept created by German philosopher Jürgen Habermas. It's the sum total of information and communication "spaces" that people use when they exchange views, formulate opinions, and collaborate on projects. And it's upon and with these "spaces" that a democratic society is

[2] http://publicsphereproject.org/patterns/

created, maintained, and changed. Without a thriving "public sphere" the people's ability to manage public affairs equitably and effectively is impossible. Although new digital networked technologies are only part of this picture, they obviously represent a major source of opportunities—as well as challenges—for those interested in the public sphere.

The Public Sphere Project is an initiative of Computer Professionals for Social Responsibility and is in the process of becoming a non-profit organization. Its main goal is to help promote more effective and equitable public spheres all over the world using a variety of interrelated activities and strategies.

One of our primary activities is building and supporting networks of activists, researchers, and citizens. We intend to do this by convening forums (both face-to-face and online) for sharing information, concerns, and ideas and by developing and disseminating useful, high-quality information for citizens, activists, students, policy-makers, and researchers.

We are interested in consulting with existing projects, systems, applications, and organizations all over the world while continuing to develop and evaluate relevant new interfaces, applications, collaborative and deliberative (and other) systems, and organizations. Two current projects include developing the next version of e-Liberate, an online system that helps convene distributed meetings using Roberts Rules of Order and organizing "Tools for Participation: Collaboration, Deliberation, and Decision Support," a conference that will be held in June, 2008 at the University of California, Berkeley campus.

Civic intelligence is intended to help bring to light the reality that millions of people around the world are "working on the same project"—without necessarily realizing it. Humankind is woven into a vast web (with the rest of the natural and artificial world) that exists regardless of people's willingness to acknowledge it and its far-reaching implications.

Today's realities are quantitatively and qualitatively different than yesterday's. They may finally force humankind to reject the "us versus them" mentality (and other destructive perspectives) that unite, for example, the people and institutions around the world for whom violence (military, economic, or otherwise) is an acceptable way to address problems.

We can continue to cling to yesterday's easy—and *wrong*—answers or we can realize that we cooperate or perish. The choice is ours.

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Civic intelligence and the security of the homeland

John Kesler with Carole and David Schwinn[1]

"We lie in the lap of an immense intelligence. But that intelligence is dormant and its communications are broken, inarticulate and faint until it possesses the local community as its medium." John Dewey

When we were told by our nation's leaders after the tragic events of 9/11 that our job as citizen fighters of terrorism was to carry on with our normal day-to-day activities, the message conveyed was that it is the government's job to take care of us in times of crisis at home and abroad. Those who took comfort in those words, assuming that the government did, indeed, have the intelligence, integrity, capacity and range of options available to address any looming threats to our security, soon learned that the government's intelligence was flawed, its integrity questionable, its capacity severely limited, and that the primary and preferred means of intervention were military incursions abroad and restraints on civil liberties at home.

The effectiveness of these approaches has proven to be far less than promised by their vocal advocates and, by nearly all accounts, the security of the homeland is no better, if not worse, than it was prior to the fateful events of 2001. If further proof was required, the horrific experiences of those impacted by hurricanes Rita and Katrina provided haunting, visual evidence that depending on some far away, larger than life, complex bureaucracy for our safety is pure folly. While the larger bureaucracy's role in national security will not, should not and cannot be diminished, truth be told, none of us will be

[1] The authors are associated with Ingenius, a Michigan-based consulting organization focusing on an integral community building approach to increasing civic intelligence. www.ingeniusonline.com

secure until the human capacity for addressing the critical challenges of our time is deeply embedded in our communities and organizations, and at all levels of society.

The term that perhaps best describes the human capacity that is required in these times is *civic intelligence*. Originally defined by Doug Schuler of Evergreen State University[2] as "the ability of groups and organizations and, ideally, society *as a whole* to conceive and implement effective, equitable, and sustainable approaches to shared problems," the term implies that there is a developmental process through which this higher order mode of perceiving and functioning on behalf of the common good can evolve. Surely the deliberative democracy, co-intelligence, and a wide variety of other community building initiatives, including the safe, healthy, sustainable, resilient and other movements, aim to develop this human capacity. A plethora of communal and conversational methodologies including multiple forms of dialogue and forums for participation including circles, world café, citizen juries and others are being used extensively for precisely this purpose. This paper suggests that the effectiveness of all of these efforts and initiatives could be enhanced by an understanding of civic intelligence as a developmental process that can be influenced through highly skilled integral dialogue and facilitation.

Five Levels of Civic Intelligence

Describing civic intelligence as a human capacity to be developed puts it in a category of other intelligences, including those described by Howard Gardner, as well as other intelligences more recently proposed including Emotional Intelligence and Cultural Intelligence. Like most of these other intelligences, each major emergent developmental level of civic intelligence reflects its own characteristic motivations, framing and capacity. Each successively higher level of emergent capacity and competence transcends and includes lower levels.

The five levels of civic intelligence awareness discussed here represent the range of development of what could be called "personal" as opposed to pre-personal and trans-personal. The personal range reflects the *relational* core

[2] See Schuler's *Civic Intelligence and the Public Sphere* in this book or at www.oss.net/CIB.

energy of interfacing with others in a spirit of reciprocity. Since relational reciprocity dynamics between the individual and others is the foundation of civility, this range of reciprocity dynamics is also referred to as the *civil range.*

CI LEVEL	MOTIVATION	FRAMING	CAPACITY
Level C+1 Member/Social Order	Physical wants and needs; respect for power	Fundamentalist outlook, derived from higher spiritual truths or cultural imperatives. There is one truth and it should be enforced. Non-believers are infidels.	Capacity for functioning freely and responsibly within clear and well-enforced civil rules. Lashing out at nonbelievers is justifiable behavior.
Level C+2 Individual/ Recognize Peer	Drive to achieve one's own self interest; respect for fairness	Self-centered perspective, but able to see one's self in the other, to recognize a peer.	Capacity for negotiating one's self-interests based on rules of transactional fairness. Unilateralism is justified in service to one's own ends.
Level C+3 Citizen/Culture Centric	Preservation of society in order to protect rights of self and others; respect for cultural values	Community-centered perspective, able to recognize needs of one's own community	Capacity for mutually beneficial exchange, based on a framework of shared values and symbols. Relative denigration of other cultures is justified.
Level C+4 Individuation/ World Centric	Working toward global human rights and democracy; respect for universal human rights	Global vision and sensibilities	Can see the relevance of other human perspectives. Exploitation of nature, non-human life, and the less-developed world is justified.
Level C+5 Integral/Life World Centric	Goal of flourishing: health and life-affirming functioning of the whole; respect for all life	Deep identification with all life and the planet	Capacity to affirm all life and understand the interrelations among all living and nonliving entities

Figure 1: Matrix of Civic Intelligence Awareness Levels

Civic Intelligence Awareness Level One

Civic intelligence awareness level one (C+1) is deeply imbedded in physical wants and needs. Its ethic is still power to a great extent, but at least there is a first experience of a strong sense of interfacing civilly with others and with a collective. That is the essence of civility, which deepens and develops in profound ways through all higher civil levels of development. At C+1 there is a sense of a recognition of the importance of civil, life-affirming rules that apply to all, at least within a given group or culture. This is an important first step in civic intelligence, and is attainable (if not fully integrated) by a typical six or seven year old child. Yet frequently, public discourse falls below this level, which may be significantly below the mean developmental center of gravity of the people who comprise the group or community.

Civilly inspired rules of C+1 are the most concrete manifestations of our higher, caring and life-affirming commonalities, even as they are rigid and not sufficient for complex higher level functioning. Yet these civil rules, which we all tend to learn in kindergarten – including cleaning up after ourselves; not telling lies; not taking things that don't belong to us; learning to share and to play with others – establish a strong foundation for further growth and higher civilization. People at a C+1 framing awareness or a cultural tradition with a center of gravity on this level are not prepared for full scale democratic freedom and concomitant responsibilities, but they can learn to function freely and responsibly within clear and well enforced civil rules.

People with a moral and cultural center of gravity at C+1 typically have a simplistic and fundamentalist outlook, whether that fundamentalism is derived from higher spiritual truths or lower culturally emergent imperatives. The concept of separation of church and state, for example, is out of the question at this level of awareness. It makes no sense. There is one higher truth, and it should be enforced. Those who are not believers are infidels (i.e. infidels, not to be trusted), that is, inherently less truly human than those in the group. In addition to receiving respect, there is a strong need at this level to have voice, to share and, if possible, to enforce one's vision of truth and meaning on others.

There is ample justification within this C+1 worldview to lash out against those who would disrespect the faith (fidelis), and fail to give dominant voice to those in the faith. The primary justification of Osama Bin Laden's sponsorship

of terrorism against the West, for example, comes from C+1 dogmatic beliefs and moral motivations, which are force and violence, although the action-logic of these terrorists comes from a pre-civil level of awareness.

Many countries in the developed world show little wisdom in avoiding violence emanating out of C+1 awareness or below, either within their own borders or globally. They inadvertently spawn what they are seeking to eliminate in this regard due to a lack of appreciation of the nurturing requirements of full spectrum developmental well being. An ironic result of America's frequent tendency of not recognizing countries that do not live up to its expectations, for example, is to reinforce and even increase the pathological nature of those the US most opposes. Perhaps, the best way to weaken the pathological tendencies of a paranoid dictatorship in North Korea or extreme religious fundamentalists in Iran is to engage them rather than isolate them, although firmness is necessarily the bottom line.

An amazing transforming effect can take place when people who feel they receive little respect and are allowed no voice are given such respect and an opportunity to really be listened to, together with the freedom to be responsible for their own lives, livelihoods and communities. Wherever possible the developed world should promote life-affirming respect, voice, freedom and empowerment for all people. As we create conditions for democracy, democratic capacities ultimately begin to emerge that are developmentally appropriate and unique to each setting over long periods of time, if properly nurtured. This is quite different from imposing existing democratic practices and institutions of the West on developing countries or expecting democratic capacities to emerge in the short term. In any case, those groups and countries at C+1 or below that lash out at others due to their own limitations of empathy and reciprocity must often be restrained with force or threat of force rather than reason or dialogue.

Civic Intelligence Awareness Level Two

The second level, C+2, typically arises in the developed world at the eight to twelve year old age range. It is deeply self-centered and motivated by the more sophisticated drive to achieve one's own interests. Anyone in Western culture who has teenagers in their family knows all about this phenomenon. One's

more highly developed sense of self can be directed outward for the first time to see one's self in another person, to recognize a peer. This is a critical step in personal accountability in society, and contains the seeds of achieving global caring awareness for all people. C+2 civil reasoning provides that if another person who is a peer has a certain opportunity; I should have that opportunity and vice versa. It generates a capacity for basic reciprocity where we negotiate according to rules of transactional fairness and in the framework of existing law and regulations for one's own self-interest. The logic of C+2 perspectives is supportive of the most basic civic framework in a constitutional democracy: *I will be responsible to respect your rights, because I want and expect you to respect mine.*

Civic Intelligence Awareness Level Three

In terms of civil awareness, C+3 establishes even deeper interiority and enables one to identify with diverse communities and broader cultures under a framework of shared values and symbols. The logic of this ethic yields a higher iteration of the 3R's: I *should respect my own right to be responsible*. One who transcends and includes C+2, the 3R's of living in a society grounded in rights, is also responsible to preserve the communitarian caring solidarity that makes the exercise of those rights sustainable, to have a commitment to the common good. It is critical to appreciate that a mentality and a form of society grounded solely in individuality, self interest and rights, is a society that will not long survive.

C+3 generates the capacity for mutually beneficial reciprocity and building strong families, groups, and communities which are not, however, highly diverse. It reflects a higher range of what is called conventional moral awareness, which enables one to appreciate one's own culture and societal values, but to the relative denigration of others outside the culture. The deeply hierarchical typical American high school which brutalizes those at the bottom of the cultural hierarchy, to the point where a Columbine tragedy can occur, reflects classic low functioning C+3 dynamics. Only a minority of people in any early 21st century culture have developed a level of civil, moral and interpersonal awareness above C+3. This is a serious challenge because the complex demands of global 21st century realities actually require C+4 and C+5 capacities. It should be an explicit goal of high schools to develop C+4

cognitive and civil capacities, while higher education should aspire to C+5 development.

Civic Intelligence Awareness Level Four

C+4 is, by definition, global in its vision and sensibilities. A C+4 perspective results in the highest iteration of the 3R's: *I am responsible to recognize all people's right to respect*, which puts into perspective a balanced understanding of the liberal rights orientation of C+2 and the communitarian orientation of responsibility and community of C+3. It is the first level of awareness which takes seriously the deep seated need of all people to be respected, and instinctively works toward global human rights and democracy. Civil capacities do not evolve at the same rate as cognitive capacities. It is all too common for people to develop C+4 cognitive capacities that are stressed by contemporary higher educational systems in the developed world. These individuals have a transcultural vision of the world, but still function at lower levels of civic intelligence, which translates into, "the world is my oyster to exploit at will."

The classic stance of the modern outlook has been a combination of a cognitive level equivalent to C+4 combined with a civil and action logic line of development at around C+2. This is still a primary theme of developed societies, the cultural legacy of modernism, which is often disguised under the veneer of high sounding phrases such as saving the world for or spreading democracy. In addition, C+4 awareness does not tend to extend to appreciation of the importance of non-human life beyond its role in being of service to humanity's needs. This is an attitude which may not be adequate to preserve sustainable ecologies (even as it is humanity that needs the sustaining) and is not sensitive to the suffering of non-human life.

Civic Intelligence Awareness Level Five

Just as C+4 senses the importance of giving respect to all people, C+5 is the first level of awareness which experiences a deep appreciation of the importance of giving everyone voice. Hence, C+5 is the first level of civic intelligence which deeply recognizes the need of people at every level to have an opportunity to have the voice they so desperately want and need. The voice

of every level of development within each of us and among all people is important. The health and life-affirming functioning of the whole interrelated and integrated spectrum of awareness is a C+5 goal. It is with this highest and integrative perspective that we can see for the first time how explosive the global situation is where people and cultures are not given both respect and voice. In this regard there is an important C+5 movement called *compassionate listening*, where people listen to others patiently, particularly those who have undergone great suffering. Bearing witness and knowing that someone is listening turns out to be more important to many people than material aid that could be provided or vengeance that might be asserted against a perpetrator of heinous acts.

C+5 is governed by the golden rule of reciprocity expressed in its most profound sense*: I will treat you in all your uniqueness and particular context as I would like to be treated in all my uniqueness and particular context*. In its most mature expression, C+5 manifests what could be called the *green rule*, which is, a deep respect and concern for and even a deep identification with all life and the planet.

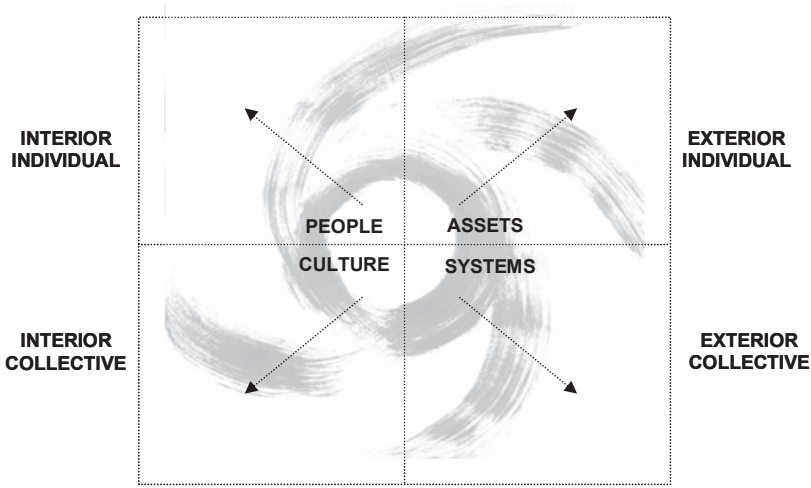

Figure 2: All Quadrant/All Level Framework

Even as C+4 negotiates the balance of agency and communion, of individuality and the communal, of freedoms and responsibilities, C+5 also balances the tendency to be progressive versus conserving what exists, the pull of transformation versus the embrace of what one already values and has worked well.

In short, C+5 level awareness is *integral*. In this context, *integral* refers to the capacity to view reality through a whole, comprehensive, all quadrant/all level or AQAL lens or framework (See Figure 2), as suggested by Ken Wilber and other theorists. At this level individuals are able to honor perspectives from all quadrants and at all levels. Ultimately, C+5 integral civil conversation is embracing of all perspectives, is more discriminating, and yields higher quality results than the levels below it. For in-depth exploration of the AQAL model, visit the Integral Institute at www.integralinstitute.org.

Need For Integral Dialogue And Facilitation

Currently, mature C+5 integral capacities are reflected in relatively few adults. It is important to note that one's civil functioning including related cognitive, moral and interpersonal capacities (summarized here as civil), and expected actual decisions and behavior (i.e. action logic) are typically at least a level or two below one's cognitive line of development. Thus, perhaps 40 percent of adults in the West have C+4 cognitive development or higher, but most of those will reflect civic intelligence lines of development at C+2 or C+3.

Most adults in the developed world, however, have the capacity to grow civilly rather rapidly because the civil level can move up to its corresponding cognitive capacity relatively quickly with proper exposure and practice, and with institutional and process attractors.

Needless to say, nearly all of the forums in which we engage individuals for purposes of motivating action in service to the common good are populated by people at a wide range of civil capacities or levels of civic intelligence awareness. The challenge is to work with the levels and perspectives of participants in such a way that opportunities are created for raising the group's center of gravity to higher levels of awareness and functioning.

These dialogic opportunities require mature C+5 facilitators who are able to take account of subtle energetic reciprocity that exists at every level of our beings – physical, emotional, mental and spiritual – as well as what might be called cognitive perspectives. In other words, the energetic field of any group is a unique combination of energetic interchange, conflict and reciprocity. It takes someone with mature integral capacities or above to consciously influence the energetic field and to integrally nourish it.

Such an integrally mature person brings balance and harmony by her very presence, and fosters healthy reciprocity at all energetic levels. By being extraordinarily influential in this regard, what she does will be substantially invisible because people with lower level awareness do not grasp what is happening. Over time, however, they tend to appreciate the achievement of better outcomes.

Mature facilitators often end up in charge because positive things just seem to happen when they are present. However, people will tend not to know how to value or recognize such a person, for she often will have done nothing skillful which is observable by others in the forum. This is why the integral leader is often behind the scenes or perceived as "following the flock." A well-developed integral facilitator/leader will not care, and will be visible and use more recognizable strategies to the extent that it is helpful to stimulate more full-spectrum integral civil conversation.

A trained integral facilitator is aware of frames of reference of the participants, together with their developmental levels of world view, behavior and conversation.

- She has the ability to sense this, even though people are individually complex and unique.

- She is able to engage people whatever their level and frame of reference, raise the median level of civil conversation, and facilitate a shared awareness and appreciation of all voices.

- Ideally, she helps participants better connect with one another on the common ground of their shared humanity and within a caring integral field.

- She might encourage consideration of the impact of a decision that has been made to the satisfaction of all community stakeholders on people beyond that community, wherever there might be a potential impact due to the decisions being made.

- That is, she will encourage consideration of the voice and needs of non-human sentient beings and the broader ecologies of life.

A highly evolved integral facilitator will not only engage others, but will experience deep empathy and compassion for everyone participating in the forum. By her very presence she strengthens the integral field, which better endures conflict and contention, and creates the likelihood of creative and emergent approaches to addressing virtually any issue in a way that better meets everyone's needs.

As a practitioner, her mode of doing this is as much intuitive as rational. As she so engages she may create a space for conflict or non-civil expression, understanding that unmet needs on sub-civil levels need to be addressed. When unacknowledged power, discrimination and suppression are not addressed, all the civil conversation in the world is not going to fully and civilly stabilize a situation unless such issues are brought out into the open and addressed.

If people behave in sub-civil ways, such as using power and manipulation or other disruptive tactics, an integral facilitator creates a space for them to have an opportunity to participate, to be respected, heard and understood. She instinctively knows what she needs to do to connect and be effective. As such, a facilitator or leader with such awareness can actually be extremely tough if integral wisdom and compassion would so indicate.

A more mature integral perspective realizes that people are where they are developmentally, and attempts to address developmentally appropriate and legitimate needs and concerns of each person, group and culture. People must

meet the needs of their own highest level of development to some significant extent before they can move on, and society should foster healthy translation within and among the full range of developmental levels. The goal is not to change people, but to sustain them in fulfilling themselves in terms of their own developmental level, exposing them to life-affirming principles and patterns and opportunities and higher level attractors for personal, cultural and institutional growth over time.

At first, perhaps the next decade or two, the greatest C+5 leadership will probably come from those who can serve in an integral advisory and facilitating capacity, helping to build bridges among people and institutions in every society and across the planet and integrally informing existing political parties and movements. Integrally informed civil conversation will be the life blood of an emergent integral politics.

Integral C+5 perspectives and capacities will enable all levels of civil conversation, culture and behavior to be honored, interconnected and integrated in life-affirming developmentally appropriate ways for the benefit of all levels of awareness within each person and within every society and across the world.

In the long run it will be important not only to train professional integral leaders/facilitators but to teach large numbers of people higher civil conversation and integral facilitation skills in all dimensions, sectors and levels of society.

As civil society and the private, non-profit and public sectors begin to institutionalize integral conversation, processes and forum structures, the foundation will be laid for profound and interconnected transformation through all sectors and quadrants.

Potentially, over the very long term, the human capacity required to address the critical challenges will become deeply embedded in our communities and organizations, and at all levels of society.

Creating a Smart Nation

Robert Steele[1]

In an age characterized by distributed information, where a majority of the expertise is in the private sector, the concept of "central intelligence" is an oxymoron. In an age where General Tony Zinni, USMC (Ret), has stated on the record that only 4% of his Central Command information and insight came from secret sources and methods, the persistent spending of $60 billion a year on that 4%, and next to nothing on open sources and methods in 183 languages we do not speak, must be defined as institutionalized lunacy.

The greatest threat to both national security and national economic competitiveness is ignorance—uninformed decision-making. Intelligence communities are slowly discovering that they should not send a spy where a schoolchild can go, and that spies are not harnessing the vast distributed intelligence of the private sector, nor knowledge in 183 vital languages.

Unfortunately, the culture of intelligence in most countries believes that its uniqueness rests on secrets rather than thinking—on producing secrets rather than informing policy.

To survive in the 21st century, every nation must become a "smart nation" and engage all of its citizens—every citizen must be a collector, producer, and consumer of intelligence—and thus, create the Virtual Intelligence Community. To integrate and make the best use of both open-source intelligence and traditional classified intelligence, each nation must establish a National Information Strategy, which addresses connectivity, content, coordination, and computational security.

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[1]An earlier version, written in 1995, appeared in *Government Information Quarterly*, Volume 13, Number 2, pp 151-173 (Summer 1996). It also appears in *The Smart Nation Act: Public Intelligence in the Public Interest* (OSS, 2006). The second sentence has been added to this chapter, drawn from www.oss.net/OSINT-S.

Introduction

This chapter outlines both the requirement for, and a recommended approach to the creation of a National Information Strategy. Despite the fact that we have leaders in both the administration and the legislature who understand the critical importance of information as the foundation for both national security and national competitiveness at the dawn of the 21st century, our leadership has failed to articulate a strategy and a policy which integrates national intelligence (spies, satellites), government information, and private-sector information objectives and resources

In the Age of Information, the absence of a National Information Strategy is tantamount to abdication and surrender—the equivalent of having failed to field an army in World War II, or having failed to establish a nuclear deterrent in the Cold War. This chapter is both an orientation for citizens and bureaucrats and a call to arms for both policymakers and legislators. It is a fundamental premise of this chapter that in the Age of Information, the most important role of government—at the Federal, state, or local level—will be the nurturing of the "information commons."[2]

National security will be largely a question of protecting information infrastructure, intellectual property, and the integrity of data. National competitiveness will be completely redefined: corporations and individuals are competitive in a global economy—and it is the role of nations to be "attractive" to investors. How nations manage their information commons will be a critical factor in determining "national attractiveness" for investment in the 21st century.[3]

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[2] Lee Felsenstein, then of the Interval Research Corporation, is the originator of the term "information commons."

[3] I am indebted to Dr. Katrina Svensson, of Lund University, who brought to my attention the work on decision-support and information access as a key to national competitiveness. Her views are consistent with those of Secretary of Labor Robert Reich, who defines "U.S. companies" as those that employ U.S. citizens and pay U.S. taxes See also Len Oxelheim, "Foreign Direct Investment and the Liberalization of Capital Movements in the Global Race for Foreign Direct Investment," *Prospects for the Future,* edited by Len OxeIheim (Berlin: *Springer-Veriag,* 1993). See also his. *Financial Markets in Transition: Globalization, Investment and Economic Growth.* London & NY: Routledge (1996).

This chapter addresses and defines the challenge of change; the information commons and information continuum; the theory and practice of intelligence in the Age of Information: the ethical, ecological, and evolutionary implications of this approach; the need to reinvent and integrate national intelligence (spies and satellites) into a larger network of distributed intelligence largely accessible to citizens; and, finally, the concrete elements which must comprise the National Information Strategy.

The challenge of change

As we enter the 21st century, we are faced with several dramatic challenges, confronted by order-of-magnitude changes that defy resolution under our existing paradigms and organizational or policy structures.

The most obvious challenge to government as a whole is the changing nature of the threat. Since the rise of the nation-state, with its citizenship, taxation, and standing armies, the most fundamental national security issue for governments has been the sanctity of its borders and the safety of its citizens and property abroad. Physical security maintained by threat of force was easy to understand and easy to implement. Today, we face a world in which transnational criminal gangs have more money, better computers. better information, and vastly more motivation to act and to act ruthlessly, than most states, Perhaps even more frightening, we face a world in which we are allowing technology and limited policy understanding to create very significant masses of displaced and alienated populations—including sizeable elements within our own borders; at the same time, we are ignoring our government's obligations to provide for home defense, for electronic civil defense, in the private sector.[4]

[4] Hackers" are not the threat. As I have noted on many occasions, hackers are a national resource because they are forcing us to acknowledge that "the emperor is naked." Sherry Turkle in *My Second Self: Computers and the Human Spirit* (New York: Simon & Schuster, 1984) examines the origin of "hacking" at MIT and demonstrates conclusively that the hacker ethic is identical to "right stuff" associated with the early astronauts---both push the edge of the envelope striving for excellence. The actual "threat" to our national information infrastructure begins with bad engineering and culminates primarily in authorized users doing unauthorized things. David Ioove, Karl Seger, and William Von Storch note in *Computer Crime: A CrimeFighter's Handbook* (Sebastopol, CA: O'Reilly & Associates, 1995) that economic losses associated with

Since this chapter was written, and ignored by government when published in 1996 (just as the Congress and White House chose to ignore the Peak Oil testimony in 1974, and varied other testimonies about toxic products, the externalization of "true cost" and so on), the High-Level Threat Panel of the United Nations, with LtGen. Dr. Brent Scowcroft, USAF (Ret.) as the US member, has published a report that identifies and prioritizes the ten high-level threats to mankind.[5] These are addressed in "World Brain as EarthGame™ (Chapter II-05-01), but because they are so relevant to the prescience of this chapter in 1994, and the urgency of this chapter in 2008, I list the ten high-level threats in the footnote and make two points: first, none of these threats recognize artificial political borders; and second, 80% to 99% of the information needed to addresses these threats is not secret, and generally not in English and not online. Our secret intelligence world is inside out and upside down, as I explain in the *Forbes ASAP* article, "Reinventing Intelligence." (2006); it is time for the public to stop waste. It's *our* money.

There is another important change requiring government diligence, and that is the change in the role of information as the "blood" of every enterprise, every endeavor.[6] Three aspects of this change merit enumeration: first, each citizen, whether conscious of this fact or not, is increasingly dependent on accurate and timely information in order to be fully functional; second, the "information explosion," like a major climatic change, is making it difficult for citizens accustomed to slower times and simpler tools to adjust to the requirements of life in the fast lane of the information superhighway; and finally, most citizens, stockholders, and business managers do not realize that we have national telecommunications, power, and financial networks that have been designed without regard to security or survivability.

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computers are attributed as follows: 55% to human error and 20% to physical disruption such as natural disasters or power failure (one could say, poor computer design), 10% to dishonest employees; 9% to disgruntled employees; 4% to viruses; and only 1-3% to outsider attacks. 2007 Note: The Chinese have made major advances in using precision electrical pulses to neutralize the electronics of satellites, in-flight weapons, and all forms of mobility systems. See the Memorandum.

[5] *A More Secure World: Our Shared Responsibility--Report of the Secretary-General's High-level Panel on Threats, Challenges and Change* (November 2004).

[6] For over 1000 books on this topic and related matters, see my reviews and lists at Amazon.com, which has become an essential starting point for shared knowledge.

It is not safe, today, to work and play in cyberspace, and we do not even have a body of law that requires communications and computing providers to assure their customers that their services and products are safe and reliable.[7]

In brief, we now have an information environment in which every citizen needs to be a collector, producer, and consumer of "intelligence," or decision-support; and at the same time, we have an extraordinarily complex and fragile information infrastructure which can be destroyed, disrupted, and corrupted by single individuals or small groups now capable of attacking our information infrastructure nodes through electronic means or simple physical destruction—and able to do so anonymously.

Defining the "information commons"

The "information commons" can be viewed-as the public commons for grazing sheep was once viewed in old England-as a shared environment where information is available for public exploitation to the common good. There are three major information "industries" that must contribute their fair share to the commons if the commons is to be robust and useful

The first, relatively unknown to most citizens, is the U.S. intelligence community, traditionally associated with spies and satellites. In fact, between 40% and 80% of the raw data going into the final products of the intelligence community comes from "open sources"—from public information legally available.[8] Unfortunately, this S25 billion (today $60 billion) dollar-a-year

[7] The seminal work in this area is Winn Schwartau, *Information Warfare: Chaos on the Electronic Superhighway* (New York: Thunder Mouth Press. 1994). Thoughtful papers on the vulnerability of specific networks include Maj Gerald R Rust, "Taking Down Telecommunications" (School of Advanced Airpower Studies, 1993); Maj Thomas E. Griffith Jr., "Strategic Attack of National Electrical Systems" (School of Advanced Airpower Studies, October 1994); and H.D. Arnold, J. Hyukill, J.Keeney. and A Cameron, "Targeting Financial Systems a Center of Gravity: 'Low intensity' to 'No Intensity' Conflict," *Defense Analysis,* 10(2, 1994). One major U.S. government agency, extremely competent in computing, intercepted all communications and computing hardware and software reaching its loading docks for a period of one year. It found 500 separate viruses contained in shrink-wrapped products coming straight from the factory.

[8] The Director of the Canadian Security Intelligence Service (CSIS), Ward Elcock has stated publicly that 80% of the inputs for finished intelligence products come from open sources; the Canadian service also makes it a point to publish unclassified intelligence reports. Although the U.S. intelligence community only acknowledges 40% as the

community buries its open source acquisitions in the "cement overcoat" of classification, with the result that most of the useful public information acquired by the intelligence community at taxpayer expense is not, in fact, made available to the citizen-taxpayer.

The second, well known to most citizens as a massive bureaucracy which generates regulations and imposes taxation, is the government. The government is *not,* however, known for making information available to the public, and this is an extraordinary failure, for it turns out that not only is the government acquiring enormous stores of information at taxpayer expense on every imaginable topic, but the government also serves as a magnet for vast quantities of information that it receives "free" from other governments, from think-tanks, lobbyists, universities, and every other purveyor of a viewpoint desiring to influence the bureaucrats who comprise the government. In the Age of Information, governments must make the transition from the industrial model (vast bureaucracies attempting to deliver goods and services using a hierarchical structure to control resources) to the "Third Wave" model (small expert nodes nurturing distributed centers of information excellence).[9] There

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official contribution of open sources, the former Director for Sciences & Technology has stated publicly that the figure is actually 70%. As a general rule, if a Service is competent in accessing open sources of information, which is not the case with the U.S. Intelligence Community, it should be able to answer 80% of its essential elements of information (EEI) using low-cost legal ethical sources and methods. This does, however, require interaction with foreigners who do not have security clearances, and it is this reality that tends to constrain secret agencies from making the best possible use of open sources of information in all languages. Since this chapter was first written, over 30,000 pages have been produced by over 750 practitioners of the discipline of Open Source Intelligence (OSINT), all of which are readily accessed. The seminal chapters for the discipline are at OSINT-S and OSINT-O. See also BASIC & www.oss.net/LIBRARY as well as www.oss.net/CCC and www.oss.net/GNOME.

[9] Although several authors, including Peter Drucker, have addressed reinvention and reengineering imperatives in relation to the information age, none have done more to help public undemanding than Alvin and Heidi Toffler with their books *PowerShift: Knowledge, Wealth and Violence at the Edge of the 21st Century* (New York: Bantam1990) and *War and Anti-War.: Survival at the Dawn of the 21st Century* (Boston MA: Little Brown, 1993). Most recently, they published Revolutionary Wealth: How it will be created and how it will change our lives (Currency, 2007) which dots the i's and crosses the t's on trends they foresaw decades ago, to wit, in a digital era, wealth can be multiplied by sharing information. Other books make this point as well, here I provide

are some significant capabilities within government intended to address this issue, including the National Technical Information Service (NTIS) in the Department of Commerce and the Defense Technical Information Center (DTIC) in the Department of Defense, but by and large government information is *out of control.* If the intelligence community is a S60-billion-a-year industry, then the U.S. government (defense only) can safely be assumed to be at least a $900-billion-ayear industry driven by information.

The third "industry" capable of contributing to the information commons is the most important, the most diverse, and the most dynamic—it is the private sector. This has extraordinary implications for both governance and enterprise in the 21st Century, because of four characteristics of "knowledge battle" in the 21st century that governments must recognize if they are to do their part:

- First, 90-95% of knowledge is open, not secret—governments that continue to believe in secrecy as the paramount element of executive action will fail;
- Second, the center of gravity is in the civil sector— governments that continue to rely on their military and their police and exclude from consideration the role of private sector capabilities, will fail;
- Third, information today is *distributed*—governments that persist in relying upon "central intelligence" structures will fail; and
- Finally, information is multilingual—governments that do not invest in analysts and observers able to move easily in multilingual environments will fail.

If the intelligence community is a $60-billion-a-year industry, and the U.S. government (defense only) is a $900-billion-a-year industry, the private sector can safely be assumed to be a $2.5-trillion-a-year industry in need of $100 billion or more of early warning and estimative, real-time, and deep discovery commercial intelligence (decision-support).[10] I want to stress this: if the

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only a few titles: Barry Carter, Infinite Wealth: A New World of Collaboration and Abundance in the Knowledge Era (1999); Yochai Benkler, *The Wealth of Knowledge: Intellectual Capital and the Twenty-first Century Organization* (2003); Tom Stewart,The Wealth of Networks: How Social Production Transforms Markets and Freedom (2007).

[10] At the time this was originally drafted, 1995, the U.S. Intelligence Community

financial and business communities do not get smart fast and recognize the true costs of their current business practices, they will be insolvent within 10-15 years.

The information continuum

The "information continuum" for any nation is comprised of the nine major information-consuming and information-producing sectors of society: schools, universities, libraries, businesses, private investigators and information brokers, media, government, defense, and intelligence.

It is very important to understand three basic aspects of the information continuum:

- First, each organization within each sector pays for and controls both experts and data that could contribute to the information commons. Perhaps most importantly from the taxpayer and government point of view, these distributed centers of excellence are maintained at no cost to the government.
- Second, it is important to understand that what any one organization publishes for sale or for free, whether in hardcopy or electronically, represents less than 20%—often less than 10%—of what they are actually holding in their unstructured databases, email depositories, or in the tacit knowledge of their individual employees.
- Third, and why a National Information Strategy is essential, it is important for both citizens and bureaucrats to realize that across the information continuum there are "iron curtains" between

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budget had been cut back from $30 billion a year to $25 billion a year. Today (2007) it is known to be at $60 billion a year, with $8-10 billion of that being for the simple protection of secrets—the cost of storage and security, not the cost of acquisition or exploitation. The deficit is just over a half trillion a year, the debt is at $9 trillion, and we have $40 trillion in unfunded future obligations. The only person in the Nation that seems truly concerned about our actual insolvency as a Nation is the Honorable David Walker, Comptroller General of the United States, and director of the Government Accountability Office (GAO).

sectors, "bamboo curtains" between organizations, and "plastic curtains" between individuals within organizations.

The role of government in the 21st century is to provide incentives and to facilitate the sharing and exchange of information between the sectors, the organizations, and the individuals that comprise the national information continuum—and to work with other governments to create an international and transnational information commons.[11]

Schools and universities have expert faculty and willing student labor as well as significant electronic storage and processing facilities. They also tend to have multilingual populations that can do very fine data entry and filtering work. Two examples are the Monterey Institute of International Studies (MIIS), which uses graduate students fluent in Russian, Korean, Vietnamese, and Arabic to maintain the world's best database on the proliferation of nuclear, chemical, and biological weapons; and Mercyhurst College, which uses undergraduate students to produce newsletters on narcotics trafficking and other trends of interest to law enforcement agencies and whose new Institute for Intelligence Studies (IIS) is both the first and the best in the USA.[12] Universities can also provide technical assistance and project assistance—one fine example of this capability, which provides direct support to local government agencies as well as small and medium-sized businesses, is the InfoMall developed by Syracuse University.[13]

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[11] Since this was written in 1995 and published in 1996, the stated objective of some formidable public advocacy groups has become that of "free universal access to all knowledge." The author shares that objective for the simple reason that it is the fastest way to unleash the entrepreneurial productive capacity of the five billion poor. Cf. C. K. Prahalad, *The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits* Wharton, 2004). It was this book that persuaded me to create the non-profit Earth Intelligence Network and devote myself to being intelligence officer to the poor.

[12] Robert Heibel, who received one of the twelve lifetime achievement awards in the field of Open Source Intelligence (OSINT) in 2006, was a decade ahead of his time. Today his program, still the best in the world, is being emulated by Johns Hopkins University and others, as the concept of legal intelligence as decision-support begins to prove its value in the business world.

[13] Today, a decade later, two individuals stand out: Brewster Kahle, who has extended his Internet Archive to include digitization projects at major libraries around the world;

Libraries represent "distributed knowledge" in the best possible way and provide citizens with not only direct access but also with skilled librarians who can serve as intermediaries in global discovery and discrimination. Examples of unique contributions in the library arena include the University of Colorado, which created Uncover Reveal to distribute electronically the tables of contents of all journals it processes; the Special Libraries Association, which brings together corporate and association librarians; and the Library-Oriented List Service developed by Charles Bailey, Jr.

Businesses not only hold significant amounts of data that they generate themselves, including customer preference data that could contribute to aggregate industry studies, but they also pay for great quantities of data, such as market surveys, which could after a short passage of time be eligible for sharing with smaller businesses and universities. One of the challenges facing nations that desire to be attractive to international investors is that of creating "information-rich" environments within which corporations can be globally competitive. One way of doing this is by developing information consortia and protocols for releasing into the information commons such data as might have already been exploited by the company that collected it or paid for it but which could now have a residual value for the larger community.[14]

Private investigators, information brokers, and commercial intelligence are addressed separately because they play a unique role in a global economy driven by information, in which information is—as Alvin and Heidi Toffler have noted—a substitute for wealth, violence, labor, and capital. The capabilities of organizations dedicated to finding and processing information can be extraordinary and worth every penny of investment. It is important to

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and Larry Brilliant, who has become the Executive Director of Google.org, with a mission of applying information to global challenges. His first investment was in the Global Public Health Intelligence Network, a totally legal, ethical, open endeavor.

[14] In the mid-1990's, during an annual conference of middle-aged hackers, popularly known as the Hackers or THINK Conference (started by Stewart Brand, today managed by Glenn Tenney) there was a discussion of what return on investment one received from volunteering information into the Internet. The *general* consensus was that for every piece of information that one contributed to the commons, 100 pieces were received in return, of which 10 were actually useful. This is a 10-to-1 noise to signal ratio, but it is also a 10-to-1 substantive return on investment (ROI). The author is an elected member of this collective.

note that one of the most significant changes to occur in relation to government is that the "information explosion" and the free market economy have led to the establishment of private sector capabilities that are superior to traditional government collection and processing mechanisms, even the most secret and expensive programs. Examples of "best in class" commercial intelligence capabilities include the Institute of Scientific Information (ISI) with its *Science Citation Index* and *Social Science Citation Index* for identifying the top experts in the world on any topic;[15] InfoSphere AB in Sweden, with a global network of legal and ethical experts and observers who work on a "just enough, just in time" basis; Deep Web Technologies, which has taken multilingual web exploitation to the next level; All World Languages, which can meet the needs for native language translation capabilities the government does not have; and East View Cartographic, which offers world-class Russian maps of the 90% of the world the USA decided not to map, at the military resolution level of 1:50,000 (1:10 meters) with contour lines.[16]

The utility of **media** information for policy, economic planning, military contingency planning, and law enforcement, is almost always severely underestimated. In fact, journalists—especially investigative journalists like David Kaplan until recently the Chief Investigative Journalist for US News &

[15] This is a good place to note that commercial intelligence is *not* about knowing how to use such services—it goes up another whole level. For example, these two indices are not worth buying in hard or softcopy unless you do a lot of citation analysis—it's much better to use the DIALOG Rank Command on File 7 (for Social Sciences), and to know exactly which information broker (Bates Information Services) pioneered the least expensive way for extracting exactly the right information to enable direct contact with the top 100 people on any topic. That in turn feeds into the one-pager for the CEO or asset portfolio manager and it is that one-page, representing the process of requirements definition, collection management, automated and human analysis, and acutely concise presentation, that *is* commercial intelligence.

[16] Most of the companies mentioned in the original article have fallen by the wayside. The field is wide-open now, and most interestingly, as discussed in *supra* note 7 and by *Business Week* in a cover story, "The Power of Us" (20 June 2005), individuals are finding that voluntary intellectual labor produces income and benefits no one ever imagined previously. Lego Corporation, in an example offered by *Business Week*, received 1,600 engineering hours free from loyal fanatic customers eager to help design new systems.

World Report, or adventure journalists like Robert Young Pelton (host of Discovery Channel, "Come Back Alive") and Robert Kaplan or Ralph Peters—are extraordinarily talented, energetic, and well-connected individuals who produce very significant and accurate reports that can be integrated into finished reports on virtually any topic. It is also worth noting that most journalists publish only roughly 10% of what they know. James Baker, former Secretary of State, notes in his memoirs that "in terms of fine-turning our own work, staying abreast of the press comments was particularly important." [17] Colin Powell, in his own book, notes that when he was Military Assistant to then Sectary of Defense Casper Weinberger, he preferred the *Early Bird* with its compendium of newspaper stories to the "cream of overnight intelligence" which was delivered to the Secretary of Defense by a Central Intelligence Agency (CIA) courier each morning.[18] In a direct and practical example, the U.S. Southern Command, working with the Los Alamos National Laboratory, was able—at very low cost—to exploit Latin American investigative reporting such that tactical interdiction missions could be planned and executed based primarily on media reporting." This is not to say that media sources are superior to classified intelligence, only that they cannot be discounted and are especially useful to those in the private sector and in much of government who do not have authorized access to classified information.[19]

Finally, we have **the government**, including state, local, and tribal governments and their information holdings, the Department of Defense, and the intelligence community. These are not examined in detail here. However, it bears mentioning that in the absence of a policy supportive of information archiving and public dissemination-and the means for implementing that policy—vast stores of information reaching the U.S. government, including information collected and processed by contractors to the U.S. government, are being "buried" each day, needlessly depriving the public of significant

[17] James A. Baker, III, *The Politics of Diplomacy* (New York: O.P. Putnam's Sow, 1995), p. 154.

[18] Colin Powell, *My American Journey* (Random House, 1995)., p. 293.

[19] This exciting story, by the principal investigator at Los Alamo National Laboratory, is contained in James Holden-Rhodes, *Sharing the Secrets: Open Sources and the War on Drugs* (Albuquerque: University of New Mexico Pre, 1994). The various laboratories of the Department of Energy are, in fact, the nation's most important open source asset, and very important examples of why we can no longer afford to compartment classified information apart from "rest of government" information.

information resources. FirstGov, now going toward its third iteration as GovUSA, is promising, as are the distributed commercially-secure storage and retrieval capabilities of IBM's Blue Genie, and the Internet Archive.

Intelligence in the age of information

Having explored in general terms the elements of the information commons and the information continuum, we now must focus on the specifics of intelligence in the Age of Information.[20] Among the core concepts that government and private sector information managers must adopt and promulgate are: Espionage, whether by governments or corporations, is less cost-effective than intelligent exploitation of open sources. Unfortunately, most intelligence communities are trained, equipped, and organized to do secrets, and they are not well positioned to collect and integrate open sources-public information-into their analysis and production processes. This needs to be changed and is discussed further below.

The customer and the environment are the best target for the application of intelligence methods (requirements analysis, collection management, analytical fusion, forecasting and visualization of information) *not* a competitor.

Decision-Support (intelligence) is the ultimate objective of all information processes. One must carefully distinguish between *data,* which is the raw text, signal, or image; *information,* which is collated data of generic interest; and *intelligence,* which is information that has been tailored to support a specific decision by a specific pennon about a specific question at a specific time and place. Most government information and so-called intelligence products are so generic as to be relatively useless in directing action. Only when information serves as the foundation for *intelligence* can its cost be justified.

Distributed information is more valuable and yet less expensive than centralized information. The art of information governance in the 21st century will focus on harnessing distributed centers of excellence rather than on creating centralized repositories of information.

"Just in time" information collection and intelligence production is far less

[20] My keynote speech to the Association for Global Strategic Information (AGSI) contained many of these operational concepts and has been reprinted as "Access: The Theory and Practice of Competitor Intelligence," *Journal of AGSI* (Ju1y 1994). My most developed work in this area**,** is my white paper, "'Access: Theory and Practice of Intelligence in the Age of Information." (October 26, 1993).

expensive and far more useful to the consumer of intelligence than 'just in case" collection and archiving.[21]

The **value of information** is a combination of its content, the context within which it is being used, and the timeliness with which it is obtained and exploited. This means that information which has been used by an organization declines in value when taken out of context and after time has passed. This, in turn, means that there is every reason for an organization to barter, share, or sell information (e.g., market research) once its "prime" value point has passed. This is especially important to an organization as a means of increasing its acquisition of new information which-in its own context and time-has greater value than when it was lying fallow in the information commons.

The new paradigm for information acquisition is the 'diamond paradigm" in which the consumer, analyst, collector, and source are all able to communicate directly with one another. The old paradigm, the 'linear paradigm" in which the consumer went to the analyst who went to the collector who went to the source, and back up the chain it went, is not only too slow but is also unworkable when you have a fast-moving topic with many nuances that are difficult to communicate. Today and in the future, the information manager' greatest moment is going to be when a consumer can be put in direct touch with exactly the right source who can answer the question directly, at low cost, by creating new knowledge tailored to the needs of the consumer, at that exact moment.

The most important information resource is the employee. Every employee must be a collector, producer, *and consumer* of information and intelligence. This is called the "corporate hive" model, and it is the foundation for creating a "smart nation." If every personnel description does not list as task number one: "collect and report information useful to the organization," and if organizations do not provide a vehicle and a protocol for sharing information among employees, then by definition the organization is "dumb."[22]

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[21] Paul Evan Peters, Executive Director of the Coalition for Networked Information, is the originator of this concept.

[22] Kevin Kelly, *Out of Control: The Rise of the Neo-Biological Civilization* (Reading, MA Addison-Wesley 1994), provide a brilliant exposition of why, in a very complex global system driven by information, organic self-healing and relatively autonomous elements must be accepted and nurtured. It is impossible to control complexity in a centralized preplanned fashion. Those concerned about the fragility of our information

Published knowledge is old knowledge. The art of intelligence in the 21st century will be less concerned with integrating old knowledge and more concerned with using published knowledge as a path to exactly the right source or sources that can create new knowledge tailored to a new situation, in real time.[23]

The threat (or the answer) changes depending on the level of analysis. The most fundamental flaw in both intelligence and information today is the failure to establish, for each question, the desired level of analysis. There are four levels of analysis: strategic, operational, tactical, and technical. These, in turn, are influenced by the three major contexts of inquiry: civil, military, and geographic. A simple example from the military sphere will illustrate the importance of this issue. Examining the capability of a specific Middle Eastern country in the mission area of tank warfare, it was found that while the initial threat assessment (by someone unfamiliar with the levels-of-analysis approach) was very high because this country had a great many modem tanks, in fact the threat varied significantly depending on the level of analysis. Only at the technical level (lethality) was the threat high. At the tactical level (reliability), the threat was, in fact, very low because the crews were not trained and had poor morale, and the tanks were generally in storage and not being maintained. At the operational level (availability), the threat increased to medium because there were large numbers of tanks widely scattered over the country. At the strategic level (sustainability), the threat dropped again to low because it would be almost impossible for this country to carry out extended tank warfare

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infrastructure would do well to read Kelly's work, a well as one predating him by 10 years, Charles Perrow's *Normal Accidents: Living with High-Risk Technologies (New York*: Basic Books, 1984). Simple systems have single points of failure **f**airly easy to diagnose. Complex systems have multiple points of failure that interact in unanticipated ways. Today we have a constellation of very complex information systems, all built by the lowest bidder and without regard to the dangers of authorized users doing unauthorized things. Robert Steele is the originator of the terms "smart nation," "information arbitrage," and "information peacekeeping."

[23] We keep forgetting that books were generally written as dissertations or started roughly 10 years before finally appearing in print; articles are generally 10 months or so old; and even newspaper stories are at least a day if not 3-10 days old. Within academic circles, it is well-known that if one is not receiving the drafts of works in progress and the pre-prints, it is simply not possible to be a serious competitor.

operations, even on its own terrain. This approach can and should be applied to every question for which intelligence—tailored information—is to be provided.[24]

Ethics, ecology, and evolution

Our "Industrial Age" concept of intelligence and information has relied heavily on a centralized, top-down "command and control" model in which the question virtually determined the answer, and the compartmentation of knowledge—its restriction to an elite few—has been a dominant feature of information operations. This chapter suggests that the true value of "intelligence" lies in its informative value, a value which increases with dissemination. The emphasis within our government, therefore, should be on optimizing our exploitation of open sources, increasing the exchange of information among the intelligence community, the rest of government, and the private sector, and producing unclassified intelligence. This could be called the "open books" approach to national intelligence.[25]

As we prepare to enter the 21gt century, we must ask ourselves some fundamental questions. How do we define national security? Who is the customer for national intelligence? What is our objective? There appears to be every reason to discard old concepts of national security and national

[24] At the strategic level, civil allies**,** geographic location, and military sustainability are critical At the operational level civil instability, geographic resources, and military availability At the tactical level, civil psychology, geographic atmosphere, and military reliability determine outcome. At the technical level, civil infrastructure, geographic atmosphere, and military lethality are the foundation for planning and employment. This is an original analysis model developed by the author while serving as the Deputy Director and Special Assistant (senior civilian) in the new Maine Corps Intelligence Center (today a Command) in Quantico, Virginia At the time, examining all products from the Central Intelligence Agency and the Defense Intolerance Agency then in hand, the author discovered that none of the products purported a specific decision and that none of the products was related to any specific level of analysis.. Everything was generic, topical, a “snapshot,” virtually useless to a policymaker or commander. Little has changed since then, one reason why some policymakers feel they can define reality in ideological terms—and a major reason why we need an ethical *public* intelligence capability.

[25] This section draws on a full-length article, “E3i: Ethics, Ecology, Evolution, and Intelligence," published in the *Whole Earth Review* (Fall 1992).

intelligence and to focus on developing integrated nationwide information and intelligence networks, which recognize that national security depends on a solid economy and a stable environment; that the center of gravity for progress in the future is the citizen, not the bureaucrat; and that our objective must be to enable informed governance and informed citizenship, not simply to monitor conventional and nuclear threats.

I am convinced that the "ethics" of national intelligence requires a dramatic reduction in government secrecy as well as corporate secrecy. After 30 years as a government intelligence professional, I am certain that secrets are inherently pathological, undermining reasoned judgment and open discussion.[26] Secrets are also abused, used to protect bureaucratic interests rather than genuine equities. Consider the following statement by Rodney B. McDaniel, then Executive Secretary of the National Security Council:

Everybody who's a real practitioner, and I'm sure you're not all naive in this regard, realizes that there are two uses to which security classification is put: the legitimate desire to protect secrets, and protection of bureaucratic turf. As a practitioner of the real world, it's about 90% bureaucratic turf and 10% legitimate protection of secrets a far as I'm concerned. [27]

Thomas Jefferson once said: "A nation's best defense *is* an educated citizenry." I firmly believe that in the Age of Information, national intelligence— unclassified national intelligence—must be embedded in every decision, every process, and every organization. The "ethics" of openness needs to apply to the private sector as well as to the government. Universities should not be allowed to hold copyrights or patents if they are not able or willing to disseminate knowledge or commercialize technology. Corporations should not

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[26] Although Alvin and Heidi Toffler have called me "the greatest enemy of secrecy" in the United States (in their book *War and Anti-War),*I am only an enemy of unnecessary secrecy because it costs a great deal—not only in dollars but also n terms of lost opportunities. My complete views are set forth in my "Testimony and Comments on Executive Order 12356, 'National Security Information.'" provided by invitation to the Presidential Inter-Agency Task Force on National Security Information, Department of Justice, June 9, 1993. I believe that we should all be strong advocates of "no classification without justification."

[27] He was speaking in 1990 to a group of government employees selected for increased responsibility and attending a Harvard Executive Program Cited in Thomas P. Coaklcy (ed.), *C4I: Issues of Command and Control* (National Defense University, 1991), p. 68.

be allowed to monopolize patents to protect archaic production processes.

The environment in which we live, in which we hope to prosper and secure the common defense, is our most important intelligence target and our most neglected intelligence target. Our traditional intelligence community and our more conventional government information community both appear reluctant to take on the hard issues of honestly evaluating the larger context within which we export munitions, keep the price of gasoline under two dollars a gallon, permit unfettered gang warfare and exploitation within our immigrant communities, and so on. At what point are we going to establish an architecture for integrating Federal, state, and local data about the natural environment and for producing useful strategic analyses about specific political, economic, and cultural issues? The following paraphrased observation by Ellen Seidman, Special Assistant to the President on the National Economic Council, is instructive:

CIA reports only focus on foreign economic conditions. They don't do domestic economic conditions and so I cannot get a strategic analysis that compares and contrasts strengths and weaknesses of the industries I am responsible for. On the other hand, Treasury, Commerce, and the Fed are terrible at the business of intelligence — they don't know how to produce intelligence.[28]

Taken in combination, what we do out of ignorance to our environment each day through our existing energy, trade, defense, housing, transportation, and education policies is far worse than a whole series of Chernobyls.

Finally, if the nation is to evolve, if it is to "harness the distributed intelligence of the Nation," as Vice President Al Gore has taken to saying in his many speeches on the National Information Infrastructure,[29] then we must come to grips with the fact that we are "losing our mind" as a nation and that education is the "boot camp" for national intelligence. We must revitalize our educational system, including corporate training and continuing education programs, and realize that openness is a powerful catalyst for bringing to bear the combined intelligence of every citizen and resident. Instead of "National Intelligence" (spies and satellites) bearing the burden for informing policy, we

[28] Seidman was speaking to the Open Source Lunch Club on January 1, 1994. Her observations were subsequently reported in *OSS Notices* 94001 dated February 21, 1994

[29] This phrase was borrowed from the author by Mike Nelson, then an aide to Al Gore.

should rely upon "national intelligence" (smart people) and use our distributed network of educated scholars, workers, information brokers, journalists, civil servants, require a depth and breadth of commitment to information as a commodity; to information as a substitute for time, space, capital, and labor. Intelligence— applied information—is vital to both our defense and our prosperity.

Connectivity is but one of the four major elements of what must soon become a National Information Strategy.[30]

For those counseling the incremental approach, "connectivity today, content tomorrow," one must say: it will be too late. The fragility of our position in the world, in terms of brain drain, budget deficit, and electronic security, all require that we establish a four-point integrated program, as outlined below, immediately.

Connectivity. Such a strategy should build upon the National Infrastructure as its technical foundation, but provide for three additional elements:

Content Existing government programs, under the auspices of a National Information Foundation within the White House, should provide incentives for all elements of the information continuum (K-12, universities, libraries, business, information brokers, media, government, defense, and intelligence) to

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[30] Among my many speeches and publications in this area**,** the following are especially pertinent: "National Intelligence Strategy: Needed initiatives," speech to the National Defense University Foundation National Industrial Security Association Symposium on The Global Information Explosion A Threat to National Security, May 16, 199S (with Alvin Toffler, Bo Cutter, Emmett Paige, Robert Johnson, and Bill Studeman); "National Intelligence: The Community Tomorrow?," speech to the Security Affairs Support Association Spring Symposium, National Security Agency, April 20, 1995; "Private Enterprise Intelligence: let's Potential Contribution to National Security," paper presented to the Canadian Intelligence Community Conference on Intelligence Analysis and Assessment, October 29, 1994; and "A Critical Evaluation of U.S. National Intelligence Capabilities" *International Journal of Intelligence and Counterintelligence* (Summer1993). I have also provided invited testimony to the Commission on Intelligence and the House Permanent Select Committee on Intelligence. Much of this material is contained in the first book, *ON INTELLIGENCE*.

put content online; only in this way can we establish a robust national "information commons" and give Robert Reich's symbolic analysts something other than a starvation diet It is vital that we establish a means of nurturing distributed centers of excellence throughout our nation in all topical areas, providing all sectors with incentives to place encyclopedic information into the 'information commons" and, thus, stimulating productivity. Just 3 billion a year invested in this program could yield enormous productivity and competitiveness gains across our entire private sector. Within government, we should dramatically accelerate NTIS involvement in structuring and digitizing information now in the possession of the government but not .-available to the public.

Coordination. Using a body similar to those now orchestrating NII technical issues, focus on resource management across government and private sector boundaries in both technical and nontechnical (content) arenas. There is no good reason why hundreds of major organizations should be wasting approximately $2 billion a year creating hundreds of variations of a basic multimedia analysis workstation. There is no good reason why hundreds of corporations and other organizations should be wasting enormous sums collecting and processing the same encyclopedic information about foreign countries, companies, and capabilities. Presidential leadership would make a difference and save the nation billions of dollars annually, not only within government but across the private sector.

Communications and Computer Security, We have a house built over a sinkhole The vulnerabilities of our national telecommunications infrastructure to interruption of services as well as destruction, degradation, and theft of data are such that experts feel comfortable in predicting that—unless we are able to establish a major Presidential program in this arena—we will see a series of enormously costly electronic attacks on our major financial and industrial organizations, generally undertaken by individuals who stand to benefit financially from degraded or interrupted performance. The current generation of systems engineers was not raised in an environment where security was a necessary element of design**.** At every level, through every node, we are wide open-and in a networked environment, one open house contaminates the rest of the network.

Such an integrated program could be established using existing resources. The cost savings from the elimination of redundant and counterproductive

investments in information collection and information technology across government departments and into the private sector would also make a substantive difference against the deficit, while inspiring productivity increases that would address our future unfunded obligations now known to exist.[31]

Conclusion

We are a smart people today, but a dumb nation. Our national security and our national attractiveness as a site for international investment which permit our citizens to prosper arc both at risk. We have no alternative but to completely redefine the role of government to emphasize its responsibility for the nurturing of our national information commons, and to redefine national intelligence so as to create a Virtual Intelligence Community in which every citizen is a collector, producer, and consumer of intelligence. To do this, we must have a National Information Strategy. The Smart Nation Act will give precisely the constellation of mixed public-Congressional-Executive capabilities needed to be the smartest, safest, most productive Nation in the Age of Information.

Addendum

The Smart Nation Act

Enabling Open-Source Information Acquisition and Multinational Decision-Support Beneficial to All[32]

- Expands and enhances the role of the **Congressional Research Service (CRS)** with direct access to all available information, advanced analytic processing tools, and sufficient personnel to provide each jurisdiction of Congress with unclassified decision-support that can be shared with constituents and the media.

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[31] One authority, Paul Strassmann, estimates that in information housekeeping costs alone $22 billion could be saved over seven years. This is apart from policy savings derived from improved intelligence support. Strausmann has been Director of Defense Information and Chief Information Offer of the Xerox Corporation and other major companies. His books, including *The Politics of Information Management. The Business Value of Computers, and Information PayOff,* and are all exceptional.

[32] Drafted in partnership with Congressman Rob Simmons (R-CT-02), a book on this subject, *THE SMART NATION ACT: Public Intelligence in the Public Interest* (OSS, 2006) is available free online at www.oss.net, or from Amazon.com.

- Protects and enhances role of the Assistant Deputy Director of National Intelligence for Open Sources (ADDNI/OS) by legislatively mandating an **Open Source Intelligence Program** (OSIP) under the complete control of the Director of National Intelligence, directing that no less than 1% of the total National Foreign Intelligence Program (NFIB) be allocated to the selective, collection, processing, and analysis of open sources of information in all languages, which are essential to the mission of the secret intelligence community. To the extent acceptable to the DNI and the ADDNI/OS, recommends that most raw unclassified information be delivered to a central federal processing facility to avoid duplicative collection by others.

- Within the Department of State, expands the capabilities of the **Undersecretary of State for Public Diplomacy** by providing the incumbent with oversight authority of the Open Source Agency (OSA) and the Office of Information Sharing Treaties and Agreements.

- Creates an **Open Source Agency (OSA),** as a sister-agency to the Broadcasting Board of Governors (BBG), with the same arms-length independence that Congress wisely mandated to assure journalist independence, but in this case, to assure the integrity of public intelligence. The small Headquarters could be constructed on the **South-Central Campus**, adjacent to the **U.S. Institute of Peace (USIP)**, which could serve as a partner in global **information peacekeeping**, and easily accessible to the employees of the **Department of State** and the **National Intelligence Council** as well as others to be based on this campus to be completed and occupied by all parties in 2008. All information obtained will be a public good freely available to all schoolhouses and chambers of commerce as well as all citizens.

- Creates an **Office of Information Sharing Treaties and Agreements**, to negotiate no-cost information sharing treaties with Nations, and no-cost information sharing agreements with non-governmental and private sector organizations including universities world-wide, while also establishing standards facilitating both sharing and semantic web sense-making across all languages. Could be co-located with the US Mission to the United Nations, or the OSA.

- Broadens the mandate of the **Broadcasting Board of Governors (BBG)** with non-reimbursable funding from the OSA to create an Internet dissemination capability that offers **free universal access to all unclassified information** acquired by the OSA, with a robust man-machine translation capability that offers **free online education in at least 31 major languages** as an important new foundation for public diplomacy and information peacekeeping. Call centers supporting schoolhouses in all languages on all topics will define the newest form of Public Diplomacy.

- Expands the concept of the National Virtual Translation Center by establishing a **Global Virtual Translation Network (GVTN)** using commercial open source software now available (www.telelanguage.com), to allow all jurisdictions to handle both 911 calls in all languages, and to do critical translations for immigrant constituencies of Congress, as well as 24/7 live remote interactive translation for diplomats and warriors in the field. This open source software system can leverage existing employees, and default to low-cost indigenous persons if online volunteers are insufficient.

- Creates a **Global Volunteer Teacher Corps (GVTC)** of translators in 183 languages who can use www.telelanguage.com to register their availability to serve as tutors to the 5 billion poor, one cell phone call at a time.

- Within the Department of Defense, converts the existing **Coalition Coordination Center (CCC)** at the US Central Command into an Office of the Secretary of Defense (OSD) Field Agency under the oversight of the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict (ASD SOLIC). The **Multinational Decision-Support Center (MDSC)** will provide unclassified decision-support to Stabilization, Reconstruction, Humanitarian Assistance, and Disaster Relief missions around the globe, as well as Early Warning and Predictive Analysis in relation to the ten High-Level Threats to Humanity. All unclassified information will be ported to the high side and into USA.gov.

- Within the Department of Defense, creates a **Center of Excellence for Computational Mathematics**, and creates a fully international network that shall evaluate all patents, products, and services that employ computational mathematics, and shall determine the degree of risk to the

US Government and to other legitimate enterprises of computational mathematics being used to violate privacy, copyright, security, or other public policy and public safety conventions, regulations, and laws. The knowledge created by this Center shall be fully and openly available to international standards and other organizations.

- Authorizes direct decision-support to the **United Nations and Non-Governmental Organizations,** and the use of that decision-support to provide **Foundations** with prioritized recommendations for giving. Funds an Assistant Secretary General for Decision Support with four deputies and five staff, ten reporting to the Undersecretary of the United Nations for Safety & Security. The Principal Deputy and the Deputy for Operations shall always be U.S. Citizens, respectively an Ambassador and a Defense Senior Leader.

- Within the Department of Defense, charters the Secretary of Defense with responsibility for substant6ially expanding **Irregular Warfare** capabilities, to include a redirection of resources toward Civil Affairs, and the creation of a **Transitions Command** with a **Joint Task Force Concept of Operations for Rapid Response Stabilization, Reconstruction, Humanitarian Assistance, and Disaster Relief.** The concepts of "Peace from Above" and "Peace from the Sea" shall be realized in support of this Joint Task Force.

- **Makes it a federal crime for anyone to use Civil Affairs as a "cover"** for any clandestine, covert, illegal, or questionable activities. Anyone convicted of this offense after due process will be reduced in rank by two grades and be subject to dishonorable discharge from service.

- Creates **fifty state-based Community Intelligence Centers** to be manned by the National Guard, and broad networks that permit citizens to report threats (119) and suspicions (114), while also leveraging a global translation network (below) that can do all languages for the 911 system (and the new 119 and 114 systems) across the Nation. This solves the current lack of a place for bottom-up dots to be collected and analyzed, while providing a channel for distributing global information to all schoolhouses and chambers of commerce as a means of enhancing our national security and global competitiveness at the local level.

University 2.0: Informing our collective intelligence

Nancy Glock-Grueneich[1]

Our society, now global, is the first that must cope with the possible demise of our species—and of much life on our planet—as the result of our own actions. At the same time, we are also the first with instantaneous access to most of the recorded knowledge possessed by humankind. In response to both of these realities, we are in the midst of a rapidly escalating, self-organizing, global movement converging on a space of great potential good, a phenomenon Paul Hawken has named "the movement without a name"[2]. This massive instance of collective intelligence, with over a million independently initiated organizations and projects already in play, is without leader, ideology, organized agenda or center. And it is growing daily. It is a movement of individuals and organizations reacting to what they perceive, each in their own way, with their own networks. Some are responding to global threats, some to needs and opportunities in their immediate vicinity. Taken together these three facts have brought humanity both to the brink of breakdown and within reach of breakthrough. We have some reason to hope, for perhaps the first time in history, that we might create a truly livable future. Not a perfect world, but a world, as Sharif Abdullah writes, "that works for all."[3]

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[1] Nancy Glock-Grueneich, President of HIGHER EDge (www.higheredge.org), has her doctorate from Harvard Graduate School of Education, taught public policy and related subjects for 15 years, and oversaw program and faculty development for the California Community Colleges for 13 years. She Co-chairs the Editorial Board of the *International Journal for Public Participation*.

[2] Hawken, Paul, *Blessed Unrest*, Ch. 1, Viking Press, 2007 (ISBN 0670038520)

[3] After a phrase from Buckminster Fuller. Abdullah, S. (1999). *Creating A World that Works for All*. San Francisco: Berrett-Kohler. See also Atlee, T. & Zubizarreta, R. (2003). *The Tao of Democracy: Using Co-Intelligence to Create a World That Works for All.* North Charleston, SC: Imprint/BookSurge.

Yet, if we are to wrest this slim chance from times so fearsome (and not only save ourselves, and our planet, but also improve ourselves), what knowledge do we need? What skills will let us influence society, in the midst of breakdowns it cannot escape, to turn the vast social and economic resources now locked in its existing institutions towards creating the world we need?

This chapter, companion to a second[4], offers a preliminary list of the knowledge needed. It suggests how higher education, as one of those social institutions whose resources need to be bent to this cause, could become part of the solution. We start with the fact that what we might call "the university" has become no longer a center for learning, but a *network* for learning—a network potentially coterminous with global society itself. Its origins lie with the collecting together of written texts, texts that attracted scholars of renown and "nations" of students to "centers of learning" that grew into universities. The reverse is now occurring as the global distribution of knowledge is "followed" by scholars and learners moving on-line. Not unlike the stars that first concentrated energy, fused new atoms, then burst, scattering throughout the universe the newly formed elements of life, so universities, having concentrated and intensified all recordable human knowledge into ever narrower disciplines, are now bursting their boundaries. Reconnecting the splintered disciplines, new ideas are scattering as seeds across the fertile movements of the world.

Conversely, with self-organizing spaces and self-correcting knowledge systems coming into their own, is there anything now done in person, on campus, for the few that cannot in principle be done, on-line, for all? Can we at last assure universal access to higher education? Why not **University 2.0**, with campuses still key but used to leverage the rapid expansion of the capacities needed to create a livable future, and expand, not artificially restrict, quality, access, and liberation. Perhaps so, *if* we can: (1) Redirect money now concentrated on enabling the few, into approaches that would equally enable the many; (2) Share universally the power of higher learning, well organized and well taught; (3) Certify competence based not on competitive ranking but on demonstrated mastery; and thus (4) Avoid defining success as doing better than others, thus logically precluding the possibility of success for most.

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[4] Upcoming issue of *World Futures* http://tinyurl.com/y4zm7k

Desiderata

How higher education could help inform collective intelligence

Empowerment

1. Extend to all citizens the **process skills**, norms and expectations known to enable community building, conflict resolution, collaborative problem solving, decision making, and systemic change.
2. Build into these processes the routine use of software, and protocols, that encode optimal forms of **deliberative discourse** and knowledge utilization as norms.
3. Envision and prepare for a culture of **deliberative democracy** and **participatory design,** where citizens expect, and officials routinely convene, these participatory processes, and act on the outcomes.
4. Teach **new conceptions of citizenship** centered in such processes and requiring the ability to use them with at least as much comfort and effectiveness as the traditional norms of ordinary business meetings.
5. Study and institutionalize as norms, the **conditions** known to develop mutual trust among people and greater concern for each other's needs and for the good of the whole, typically—and greater willingness to share effort, and appreciate others views and contributions
6. Teach the **"new story"** (See Atlee) building on ritual, spiritual, and/or artistic **foundations** where helpful and teach how to use centering, meditation, and religious practices known to increase the capacity of people to handle difficulties, work together well and help others do so.
7. Teach applied **systems** theory.. **Co-design** *with* learners at every stage, risking mistakes and learning together. Welcome the transformation of goals as much as their fulfillment, keeping open to breakthrough.

Knowledge

8. Create access to a global knowledge network that includes all proven and promising **solutions**, easily retrieved by domain, and in forms readily usable for the purpose at hand.
9. Enable for each solution, social software that encourages exchange of experiences on what worked and didn't, adaptations, etc. Regularly **harvest knowledge** and **distill** it so as to continuously improve existing practice and theory, drive formal research, and keep standards, policy and funding practices fully current.
10. Build into this knowledge system a means for ready access to legitimate **credentialing,** for example one that links from immediate solutions, and invites users to "drill down" to organized curricula for every field, academic and professional, by which anyone, anywhere
    a. Could master the essentials on the subject
    b. Connect with colleagues, others studying the subject, mentors, etc.
    c. Find/create opportunities for hands on experience or classes
    d. Connect with those who can certify mastery and issue credentials
11. For all fields with global reach, create international standards, but only as **frameworks** or templates. The actual curricula should be built upon locally derived (even learner developed) examples, assignments, and guidelines. Keep updating frameworks, from input by learners and teachers, who also co-design improved and **locally adapted materials** that meet such global standards as appropriately apply.
12. **Distribute to all** the learning, knowledge management, and communication **tools** that might meet local needs and allow each to connect, record, and share from everywhere their lives, traditions, methods, solutions, etc.

Meta-Knowledge

13. Teach **how to learn**[5]**,** as well as knowledge of diverse cognitive and cultural contributions and requirements, how teams work, and why they're needed.
14. Offer a **map** of what **knowledge** there is, and its types and uses. Connect different modes of knowing and communicating, " head, heart, and hands", with their complementary strengths and interactions.
15. Assure **skill in using knowledge**: where to find it and how to assess, apply, share, and improve it.
16. Teach the "questioning of questions" and cognizance of the effect of, as well as skill *in,* **framing issues** with the purpose of deeper exploration and collaboration, usually, rather than the "winning" of arguments.
17. Expand the concept of "critical thinking" from an individual focused on argumentation and adversarial exchange, to one of **deliberative discourse** between collaborators seeking to build relationships, understand situations, improve communication, assess options, and make wise decisions.
18. Teach the **value of conflicting views** for uncovering all aspects of a problem, and for creating solutions that are both effective and acceptable.

*How Can We Possibly Change Higher Education**?***

Notwithstanding its reputation for imperviousness to real change, the fact is that as one looks not just at formal institutions of higher education, but to the whole *system*—including its knowledge making and credentialing functions, corporate training, and international collegiality—then both structural change[6] and incipient transformation can be discerned. Within these changes, driven by outside forces of technology, globalization and, increasingly, climate change, are the means to make such changes as those listed above. We need not start from scratch but need rather to stay alert for strategic opportunities to:

[5] www.learningtolearn.com
[6] E.g. the Lisbon Convention http://tinyurl.com/27rq4n; http://tinyurl.com/yqevpo

- **Mission** Reframe the mission, and rework reward systems, and graduation and professional requirements, so that mastery of the knowledge needed for a livable future is recognized as central, and mastery of its basics, required.
- **Rules** Embed in institutional protocols and professional practices, requirements and credentialing that reflect these goals and values, so they're "normal".
- **Standards** Through professional associations, philanthropic priorities, and accrediting bodies, etc. work regionally, nationally and internationally to build in these skills and viewpoints in accreditation and professional protocols.
- **Tools** Encode the knowledge needed into software, websites, expert systems, ontologies, models, and knowledge systems, so that it is ubiquitous. Use supplementary materials, video clips, assignments, etc., to infuse this knowledge and these skills and values into existing curricula, so that working with them is frequent and compelling.
- **Credentialing** Make universally available the hardware, software, tools, and other support needed to make best use of this knowledge and to become credentialed in its essential professions, especially by those left out of the current system.

What's Working in the World

The Internet abounds with success stories and promising options, but searches for needed solutions too often yield results of uneven quality, lacking coherence and missing key questions. What is needed is a comprehensive and current knowledge base specifically for sharing stories from all quarters, and ideas, critiques, adaptations, traditions and for distilling from these stories essential information put into ubiquitously available and easily used formats. This is a knowledge base for those in the "movement without a name"—those who don't yet even know they have "a million partners"—let alone have a way to share knowledge with them

To take but four examples from millions of change provoking stories: In San Francisco[7], in a neighborhood so dangerous even fire trucks would not go into it without a police escort, local leaders and police took a brief training derived from resilience psychology, called **Health Realization**. As the leaders' insights and resulting changes in attitude, and behavior, penetrated the community, the homicide rate plummeted to zero and had stayed there for five years at the time of the report. In Senegal, women of **Tostan**[8], a literacy and self-improvement program, initiated village wide efforts to end female genital cutting which have led to a rapidly expanding, village to village grassroots effort that had in ten years led to its voluntary abandonment by fully half of the practicing population.

In **Nepal**[9], 6000 **village banks** have been started, by village women who learned accounting, banking, and small business management as part of learning to read—and did so entirely on their own money (with no loans from micro-finance organizations). The last 2000 of them did this entirely on their own initiative, in a process that had become self-replicating. In **Gaviotas**[10], in Colombia, millions of indigenous varieties of trees thought permanently lost, were spontaneously regenerated when the community planted non-native trees that turned out to create the very conditions that allowed the native trees to return.

Harvard's business school was in recent years raising over a billion dollars just to develop new business case studies based on international examples. Where are the billion dollars to study what makes social systems succeed? Where are the distilled praxis, and fully developed case studies, of conflicts prevented or resolved, natural systems restored, violent neighborhoods made peaceful, and illiterate adults becoming successful inventors? It's not that these stories of "positive deviance" don't exist, it's just that they have not been the sustained focus of our knowledge development, our college curriculum, or our popular culture.

[7] http://tinyurl.com/yonu92; http://tinyurl.com/ypysbn
[8] www.tostan.org
[9] http://tinyurl.com/yterlt
[10] http://tinyurl.com/ypysbn

The Knowledge We Need

Such case studies are essential for several reasons. They release the energy made possible by hope—*justified* hope, not just wishful thinking—in this time when it is most urgently needed. They point to the direction wherein hope lies, suggesting where best to direct our efforts, at a time when we can ill afford false starts. And they suggest needed design principles as common patterns are distilled from them. The social dynamics and methodologies identified as making these successes possible suggest better norms for social practice than we now have, including better measures and reward structures and norms that reinforce social, not antisocial, behavior.

Such stories rarely make headlines or history. In history, *who studies the wars that never happened?*[11] We are only now starting to see the necessity of figuring out what keeps human systems healthy. Psychologists are taking on "resilience studies," and problem-solving skills and dynamics focused on "appreciative inquiry"—but these studies are still marginal and under-funded.

What do we actually *know* of peace (other than that it seems to be a milksop word, lacking force, and suggesting some state of rest, some longed for stasis hardly to be achieved this side of heaven)? I wonder what we might know now if students in our military and other colleges had for generations pored over the past 3000 years of human history, studying its past social successes as assiduously as they have studied its past military campaigns. Or, if the multiple billions now spent for new weapons development were matched with equal numbers spent on new methods of social engagement and restoration. What if standing armies of millions, highly trained in the restorative skills needed, were set loose on the world to help improve it? And what if one quarter of the annual expenditures on armaments were spent to feed, clothe, and shelter and provide good water, medicine, and education to every human being on the planet —and the means for organic farming, appropriate technology, and small scale capital and green investment or decent jobs to all—thus removing major drivers of war?

Shared Solutions

Pushing the envelope of our knowledge management capabilities, we must at least invest the real dollars needed to leverage the work of tens of thousands of

[11] See Cameroon-Nigeria "non-War" over oil-rich Bakassi http://tinyurl.com/23bkh4

open source volunteers in creating as comprehensive and well organized an open knowledge system as we can muster, one that can hold all the promising ideas and proven solutions we have to date, for all of the problems we face. And then meet the challenge is to build the use of such knowledge into the day-to-day processes of every institution—school, library, NGO; local, state, and national government; international agency, corporation, and community. With these embedded in each institution's software, protocols, norms, reward systems, etc., a full shift in consciousness and practice could be achieved.

Here we arrive at the doorstep of "the Establishment". Virtually *all of the resources of intellect and authority needed to achieve the goals in this chapter, and in this book, are firmly in the control of existing institutions.* Our objective, then, must be to recognize and leverage every opportunity to influence the outcomes of changes already occurring. We can direct these outcomes towards the development and competent use of this knowledge by those whose attitudes have shifted in the direction of mutual empowerment and informed concern for the whole.

Meta-knowledge

Knowledge about Knowledge—Meta-knowledge is a concept which is basic in developing knowledge management software. It is (or should be) equally basic for human competence, especially in these times. Indeed, ***formal schooling will be less and less about learning content, and more and more about how to*** **handle** ***content*** (and about how to handle ourselves!) Knowing when to get additional knowledge, where to find it, how to judge its accuracy and relevance, how to translate, compare, and synthesize different knowledge sources, how to apply it to a given question or situation, how to represent it for different purposes and audiences, and how to improve upon it, are basic skills. And giving back into the system is now the responsibility of all, providing modifications, critiques, examples, and cultural variants—both new options, and long standing traditions. In connecting our knowledge, we connect also to each other. We can recognize how our own work fits in, and is helping move us all towards the reality of a livable future. We can see our own significance and know we are part of something greater.

Learning to Learn[12]—That some succeed, and some do not, has long been chalked up to aptitude, interest, and circumstances. But in fact, learning is itself

[12] www.learningtolearn.com

a skill, and one that can be taught. "C" even "D" students—from the most difficult of circumstances—have been reliably made into "A" and "B" students in a matter of a few months, able to carry heavy course loads, graduate from college, go on to career success. Hard data, replicated many times, show that once so changed, students don't fall back. It's not temporary but a permanent change in their habits of mind. We owe it to ourselves, and to our planet, to build on this knowledge of how to teach the skill of learning, and make it available to all. That is not to say all should be scholars, just that all should know themselves capable of making good use of these "book learning" skills when they need to.

Mapping Human Knowledge—The "structuring of ignorance," as someone once called it, may be the most important work of formal education. Self-taught people (who "quit school because it was interfering with their education") can frequently be more erudite than those who stayed in school. The one difficulty for the self-taught is that they often literally do not know that they do not know. Most of the content from school is soon forgotten. But that such content exists—and where to find it again, is not. The map with Paris on it is forever an invitation that is not available to one without that map and who never heard of Paris. Surfing the net is a peculiarly disorienting experience, where time and space collapse, so that context making disciplines, e.g. geography, history, anthropology, etc., are critical.

It is the challenge and the privilege of our times to redraw the map. The entire repertoire of human knowledge—all that is capable of symbolic representation in some form—is now opening to us from all cultures as we begin to rediscover each other. We are now earnestly seeking new ways to differentiate and integrate, and writing a new story of the human adventure.

Critical Thinking—US colleges often include within their mission, and always in their rhetoric, that students will acquire the ability to "think critically." Thinking critically is a notion that can cover everything from mastery of scholarly discourse and critique, writing and debating skills, informal logic, argumentation, and rhetoric (and/or self-defense) in the face of advertising and demagoguery. It can also include practical judgment and good sense, initiative, and the problem-solving skills that employers hope to find in their employees.

When working with several thousand faculty in the 108 community colleges of California to help them incorporate critical thinking skills across the curriculum, I would say:

> "It progresses this way: we begin by getting students to answer questions we pose from material we've given them, and then questions we pose that take them beyond that material. Then we encourage them to ask their own questions—of an increasingly comprehensive sort, and then to find answers to their questions (picking up research skills). Then we teach them to *question answers* and finally, to ***question the questions***."

This sequence of sophistication in the use of knowledge is now the core of what must be taught. Not only to college students, but to all citizens—yielding to them universal *access to higher learning.* (Which I contrast with universal access to *higher education*, the latter being access to degrees and credentialing, specifically, or in a narrower but important sense, the chance to experience "college life").

Questioning the Questions—How knowledge is presented is almost as important as the knowledge itself. We need alertness to the "spin" put on information, an alertness essential for our self-protection. We need both to learn that alertness as part of our education, and to apply it *to* our education. For example, we should notice how a notion that we are "lost in a cold, indifferent universe" has permeated what it means for something to be a "fact", and why it is that cynicism seems closer to "hard" truth. "If bitter, it must be the better medicine."

But, not so now. Now we need a restorative tonic that holds neither delusion nor disillusion. Tom Atlee suggests we see ourselves as "agents of conscious evolution," the means by which life is growing itself anew. We cannot be truly "neutral" in what motivates our words nor in their effect—nor should we seek to, but we can make more conscious choices about where our words land us. We are now learning what words invite connection and enable constructive action.

We also need to build in reminders to double-check not only *how* we are saying things, but also on what the basis. By building into knowledge tools "just in time" pointers that raise key questions, we caution users, and incidentally teach "critical thinking" on the fly. On China's long march, each person had on their back a Chinese character to be studied by the person walking behind. This "learn and teach as we go" is a good model for the work of transformation.

Deliberative Discourse — The movement for a more participatory democracy has been much strengthened in recent decades by an abundance of methodologies, and the beginnings of good theory and empirical research[13]. As this knowledge matures it should become the backbone of civics and related fields, but also of much undergraduate education and most of the professions. ***Having not only the will, but also the* competence, *to work collaboratively, and to involve effectively in the making of decisions or designs, all who are affected by them is the primary means to the future we seek.*** We have also the benefit of intensive efforts to develop ***software***[14] that make it feasible to carry on well-structured deliberative dialogue for large numbers, and at a distance. In using such tools, citizens can both contribute and learn higher order skills, including visual, intuitive, social—and other forms of—knowing and thinking—all essential to the work.

Empowerment

The basic premise of this book is that systems of human beings can, under the right conditions, reach agreements and take actions wiser than any one of them could have done alone (or that any few could have directed the whole system to accomplish). In this chapter there have been a few compelling examples of this premise in action, and a consideration of how our collective intelligence could be strengthened if we were to make access to higher learning universal. The means to achieve this aspiration—heretofore unrealizable—now exist. We have looked at how this ambition might be realized and how that could help us to create a livable future.

This knowledge is not only a means to that future, however. The continuing exercise of this knowledge is also a part of what makes that future worth having. Why then, do we not do it? It is not for lack of money nor of knowledge how to do it. It is about the upset to society that would result.

Rationing Success—The universal demand for education is prompted by the need to catch up, and by the need to stay ahead. We define "success" in the West, and now everywhere, as "doing better than others." Education, it is promised—will yield a more competitive work force. You, or your kids, will be better off—and they'll "get ahead"—get better grades. Better job. Better salary. Be able to buy into a better neighborhood. So it is *logicall*y impossible for

[13] www.thataway.org
[14] http://kmi.open.ac.uk/projects/compendium; www.globalagoras.org

education to succeed for most students. (Unless they live in Lake Wobegon!) But supposing it were otherwise? It has been shown repeatedly that people from the most unpromising of circumstances can learn to hold their own intellectually[15], but what would we do with a world where everyone had succeeded academically and expected to be rewarded accordingly? Even more challenging, what would we do with people whose education made them care about something other than "succeeding" in this competitive sense? The limiting factor is not money nor aptitudes. It is attitudes. We lack the political will to risk what it would mean if we made good on the promise of education, effective education—*empowering* education, for all. By rationing success, the current system makes people feel they deserve no more from the world than it's prepared to give them. Success for a few, mediocrity for many—and failures get nothing.

That *could* change soon, if we want. The technology for universal access is almost there. The institutions, having dealt for millennia, in scarcity now need to catch up to abundance. Soon the only limitation will be in our now outdated and dysfunctional notion of success and of why school matters. But, what if we intentionally change that notion? ***Suppose that by* higher *education we were now to mean "eliciting, enabling, and empowering our* higher *purpose"?*** And that if education as a whole were redesigned to support that goal everywhere? Suppose its job were to build our capacity to create a livable future, and we designed our learning and our knowledge systems for that end?

Empowered Participatory Governance—That's Archon Fung's term. He studied neighborhoods in Chicago,[16] where police and community members met monthly to plan what needed to be done on that beat that month to make that neighborhood more secure, and who should do what—what part was the work of police, and what part the work of citizens. Each month they reviewed the plans from the previous meeting. They reviewed the progress they'd made, what was needed now, and how it would be accomplished. Police and interested

[15] learningtolearn.com; Schoolboys of Barbianos, Letter to a Teacher (http://tiny.cc/Schoolboys) ; Warner, Syliva Ashton. 1963; 1986. Teacher. New York: Simon & Schuster; Koch, Kenneth. 1973, 1990. Rose, *Where Did You Get That Red? Teaching Great Poetry to Children*; Borzoi Books ; How to Read; Stand and Deliver; Gruwell, Erin. 1999. *Freedom Writers Diary*. New York: Broadway Books; 2007. The Great Debaters (Movie).

[16] http://press.princeton.edu/titles/7762.html

citizens got training, and met from time to time with other neighborhoods to exchange lessons learned. It worked.

In the now famous city of Curitiba, in Paraná, Brazil, ordinary people help solve ordinary problems. Can't get garbage trucks into shantytowns? Offer tickets to the municipal buses (or a bag of groceries) for each bag of trash delivered to a pickup zone. Problem solved-by the very people who lived with it daily putting their heads together. In Washington, D.C. each neighborhood gets a part of the City's budget, and a say in the overall budget. Citywide annual participatory meetings have taught ordinary citizens how to make tough choices together. Citizens are given chances to share their particular wisdom; to discover that they have wisdom to share; to abide more readily by the choices made together; and to come to care more about each other, and about the whole than they had before—or had been believed capable of.

There's no particular reason why governance of the future couldn't make this the norm, and schools teach civics as if this is just what citizens *do*. Successful models—not foolproof—but solid, are many. They are replicable. Their skills are learnable. When water starts lapping at our downtown streets and won't go away, we will be forced to do *something.* If we can succeed now in the meanwhile to learn these ways of working together, then as the catastrophes bear down on us, the "something" we do may take us somewhere better, not somewhere worse.

Bringing Out the Best in Each Other—A world worth living in for all is less likely to be an object of attack. It is less likely to trigger and intentionally goad the addictions—to material goods, drugs, anger, power and armaments—that can never be satisfied, because the real needs are never met. It is less likely to act without regard for the health of the very systems upon which it depends for its own existence. We are genetically predisposed at least as much to cooperation as to combat. Since we are now forced to redesign our world anyhow, why not design it so as to bring out the best in us?

Producing communities of communications and foreknowledge

Jason "JZ" Liszkiewicz[1]

Welcoming Foreigners, Strangers, and Explorers[2]

Airplanes, trains, and buses import and export the *human* value and personality of cities. Obviously, all of us can gain some foreknowledge before visiting a new city—by reading, watching videos, talking with people who've lived there, and speaking with citizens upon arrival. However, as we fly from one city to another, it would be nice to provide some foreknowledge of the destination. We could, in particular, allow people to see the specific routes and destinations they plan on traveling through. This would welcome them, and respect their time. Broadly, since their inception, airports and train stations have posted such foreknowledge in the form of updates for arrivals, departures, and cancellations. Airports are the welcoming stations of cities for people from all over the world.

This is one of the main starting points in creating a global identity that tells people from all over the planet how a smart city is governed. This, to me, is an enormous opportunity for a first impression, and an incredible way to provide some preparation for people's future in the city. It is easy to overlook this potential to prepare people, and miss these opportunities to catalyze, develop, and increase, the creative intelligence of a city. This can be done by identifying

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[2] Another version of this material, with color graphics to illustrate key points, can be found at http://smart-city.re-configure.org.

every visitor as a potentially valuable contributor—and receiver—respecting their past experiences and unique perspectives.

Since airplanes, airports, trains, train stations, and other methods of transportation are an extension of cities, and a bridging, or kind of circulatory system between cities, a useful opportunity would be to enable travelers to enter their travel plans into a virtual simulator—or what could resemble a gaming interface—where they could navigate through the city. They could navigate the city's historical records, peruse its statistics, and eventually do walk-thrus of *near real-time* information environments, discovering, and building an awareness of, the city's character, personality, and inter-relationships. Imagine having this on the back of every seat in a plane or train. Or imagine having this available at airports, train stations, and bus depots, and (eventually) conveniently downloadable in pieces to a mobile device.

We have weather updates, stock market updates, traffic updates, crime updates, and fire updates through radio and TV, but there is nothing that taps the vast knowledge of a city beyond that level. Certainly nothing that puts all of this information in the palm of someone's hand (as a mobile device), or in a kiosk, or in some other form of navigational display.

I am speaking of a relationship with technology that helps us to see past concrete and metal—a relationship that creates knowledge-spaces where the layers of history[3] reside and reach out beyond the physical materials. Where information cued on location is accessible and where these knowledge-spaces are interconnected with surrounding locations, building a bridge from a *knowledgeable past* to our current and future decisions.

At the root of truth, and freedom, is access. The American "land of opportunity" relates to access, and what I call the *real estate of freedom*.

If we can develop a public interface to *mirror knowledge* (a vast, publicly-accessible, visualization interface for knowledge-bases), an interface where we begin to understand with more depth of how our particular city operates, and relates to other cities, then we can be better prepared to influence (and possibly improve) our cities according to an educated, democratic, *decision-process*, creatively brought into action.

[3] http://www.geospatialarchaeology.com

Simulations have been used for many years by NASA, the military, commercial pilot training, and computer aided design of products. I think it is time to utilize these proven methods to advance *public* community developments, not just government and corporate developments (which are of an extremely limited and controlled scale).

I would like to see the virtual world, simulation technology, and gaming navigation converge through information environments, as steps towards developing more *real estates of freedom.* These would allow us to envision cities before we see them, in a way which is much better prepared (our minds become *informed environments*), to enable us to take the virtual foreknowledge *experienced* into the excitement and hectic strains of real urban travel.

Let's not view and govern our cities like museums (distant past, and untouchable)

Which leads to the most important aspect of this model, which is programming these technologies with "Internet" capabilities, spilling the qualities and attributes of the Internet into mobile and console interfaces where models of cities can be navigated through, where people can post messages for others to meet someone new, and where people can add public contributions to the virtual representation of their city. They are suddenly "publishing," not merely observing. An example moving closer and closer to this is the GoogleEarth community's showcase.[4]

Imagine virtualizing any city and giving people the means to enable them to dream about what they would like to see in their cities, no matter how outrageous. You could encourage participation before, during, and after the building of an infrastructure, harnessing contributions from everyone who will be affected locally.

Science fiction must have its science. Those in the urban development and engineering fields must be attracted to this model as well to balance any excesses of fantasy that can arise where many people are interacting to develop ideas from virtual dreamscapes into consistent, physical, daily reality.

Urban plans and architectural plans have usually been made public through motionless drawings and blueprints. People here at the CUPUM conference

[4] http://earth.google.com/showcase

obviously have different ways of thinking[5] about how to model and present work in a less static way.

We know that a city is not comprised of situated objects. Twenty-four hours a day, cities are alive with a heartbeat of patterns—day in, and day out. We are cities.

Life is animated, media should be too. Media is an extension of us, as well as an influence on thought and behavior. Stagnant, uninteresting, and lack-of-depth-media will perish. Information is just that, IN–FORMATION, not static.

If civic mediums are to gain traction, they must be designed to not only keep up with the pace of a city's news-stream, but contain the aspirations of citizens, retaining what drives them, and therefore what drives the city, and what the future holds, is what the citizens are willing and able to hold.

So far, I've illustrated foreknowledge during a particular kind of transition—people being transported into a city. Consider some near future scenarios which can provoke communications and virtual foreknowledge once a person is in a city.

Considerations for the Future

As I've stated, we can use simulation technology, and communication platforms, to obtain (as well as contribute) foreknowledge in planes, trains, and other transport and public spaces. Multiple layers of data and information environments can be intelligently modeled to prepare travelers before they enter urban landscapes, whether new or revisited.

Installing interfaces at subway stations that deliver foreknowledge instead of warnings related to past circumstances

NYC's MTA[6] (Mass Transit Authority) would rather install posters that tell people not to run down a staircase (many injuries, and I would imagine, many lawsuits, have occurred), than produce something which gives people fewer reasons to run down a staircase.

One other oddity was the posting a 1-800 number inside a subway to report emergencies. Odd, because there is no phone signal the majority of the time a

[5] http://www.stt.eesc.sc.usp.br/cupum/programme.html
[6] http://www.mta.nyc.ny.us

passenger is en route.

Aside from upgrading subway stations to be more technically equipped, like modern airports, it would be simple to have digital updates of train arrival and departures *above ground*, at the stairwells of subway stations. These schedules could also be accessible via mobile device (text messaging/sms), which could eliminate people running down the stairs from lack of the foreknowledge which could have been used to time their arrival without resorting to running down the stairs, or missing a train by seconds.

Another subway station idea is a simple example of an "online/offline pipeline" (partnerships). nyc.craigslist.org[7] has a lost and found section[8] and many posts on the lost and found are for things that were lost in subway stations or trains. Nowhere in any subway station or train will you see a poster or sign about Craigslists' Lost and Found section.

Other ideas:

- **SMS Subway Arrival**—Developing Google 's SMS service[9] (or some other similar local service) to incorporate these ideas could provide subway arrival updates and lost and found searches via mobile device text messages, without the need for Internet access or the latest mobile device operating system
- **Underground Wireless**—Wireless Internet access in underground facilities such as subway systems. Drivers have underground communications and appropriate foreknowledge, but not commuters. Yet commuters astronomically outnumber those who are either drivers or who oversee operations.
- **Rentable Media-spaces**—The availability of media-spaces, rented by citizens from those who have apartments (and those who own houses and businesses) who would like to lease space in windows or elsewhere. Those who pass by could interact with video screens using their mobile devices. A variety of ideas are possible, including posting digital graffiti and producing digital bulletin boards relevant to the neighborhood.

[7] http://nyc.craigslist.org
[8] http://newyork.craigslist.org/laf
[9] http://www.google.com/intl/en_us/mobile/sms

- **SMS Taxi Location**—A system for locating and messaging taxis via mobile device (text messaging/SMS) when drivers can't see you and you can't see them. Whether it's very late at night, or simply not obvious that a taxi is a block away, a mobile device messaging system would be of great value to both the driver and person looking for a driver (location-detecting transceiver).
- **Natural Sounds and Sound Insulation**—It would be relatively easy to integrate natural sounds and sound insulation into cities to combat the excess of noise that bounces off concrete, steel, and from vehicles, and to provide extra sanity against the avalanche of corporate messages, noise pollution, and vehicle pollution. A notable related link is the NY Society for Acoustic Ecology[10].
- **City-to-Citizen Satellites**—Governments with military agendas launch satellites in the name of their country, and telecommunications companies have theirs to sustain networks for monetary gain. Can cities utilize satellites to cast real time data to citizens with mobile devices and to kiosks? And if compatible mobile devices are not available, public spaces could be ideal places to access every variety of rich content for citizens along with foreign travelers seeking to become more familiar and to attain new discoveries.[11]

It's time to upgrade the tourist/visitor's "information booth."

One of my favorite ideas is the "citizens' intelligence network." One element of it would be having a local phone service to connect with people who have made themselves available with access to the Internet and highly sufficient intelligence resources to provide callers with near-instant content, finding anything they ask for while roaming the streets, or in a car or facility without Net access. Some ideas of mine related to a citizens' intelligence network were written about in a small business print newspaper for Brooklyn New York,

[10] http://www.nyacousticecology.org

[11] Robert Steele has told me that a US Air Force Colonel told him that there was enough residual capability in abandoned DoD satellites to provide free wireless connectivity to the continent of Africa. While much of this capability is probably old, weak, and with low bandwidth, the idea of surveying all abandoned communications satellites and determining whether they can be donated to a global non-profit "bottom-up communications provider" is worth careful consideration.

calling it a "community of the future". Someone in England saw the ideas I posted online[12] and sent me a dimly similar layout, which excited me and is being used right now in London called Directionless Enquiries.[13]

"Citizen intelligence networks" were also mentioned in an article[14] in *Forbes* magazine in 2006 by a colleague of mine, Robert Steele, who credits Alessandro Politi of Italy with the concept of "intelligence minutemen" as first articulated at the first Open Source Solutions Conference in 1992.

Current Examples in NYC and Future Prospects

- **Landing Lights Park Second Life Project:** A colleague of mine, Thomas Lowenhaupt is on a committee[15] in Queens, NY involved in taking park real estate and modeling it at SecondLife.com and getting people in the neighborhood to contribute ideas to its development. It was featured in Wired magazine in 2006[16].
- **Computerized Neighborhood Environment Tracking[17]**
- **Urban Projection Media Courtesy of the Glass Bead Collective[18]**
- "**SMS Enabled Interactive Street Performance**"[19]
- **Geo-Spatial Archaeology NYC[20]**
- **Wi-Fi Salon[21]**: Free wireless access in eighteen Parks and Recreation locations in NYC. I mentioned to the head engineer of this project the idea of "a park" being "A park experience." He said that the Wi-Fi Salon Project is "urban wireless renewal to, in part, help undo the influence of Robert Moses, who carved through neighborhoods and

12 http://www.re-configure.org/cin.htm
13 http://directionless.info
14 http://tinyurl.com/yzo8cy
15 http://www.cb3qn.nyc.gov/page/LLP
16 http://tinyurl.com/2jbc6n
17 http://www.fcny.org/cmgp/comnet.htm
18 http://www.glassbeadcollective.org/projects/projection/index.htm
19 http://www.txtualhealing.com/action.html
20 http://www.geospatialarchaeology.com/genpageframe.html
21 http://www.wifisalon.com

landscapes. Wireless will emphasize the local park and neighborhood—local content, building community, a sense of place."

- Wireless access in a park melds two freedoms. The freedom away from the noise, concrete, metal, and movements of the city, and towards the complementary effect that a park experience has on our human qualities. This is combined with the freedom to explore one's interests through wireless access. This seemingly intangible, yet accessible, resource of wireless connectivity is a new urban landscape: a potential "real estate of freedom" amplified by the park experience and with the potential to affect minds in new ways, thereby affecting the city in new ways.

- I would anticipate the arrival of **maps showing wireless reception strength** for neighborhoods, and people making themselves available for public interaction through instant messaging, and to meeting in-person with systems similar to Dodgeball[22] and Friendstribe[23], both based out of NYC, which are mobile device social software.

- There is an **acoustical technology contraption** at the 34 street NYC subway station sponsored by MIT, Apple, Bose, and about six other groups. Based on my personal experience it has provoked communication between strangers, even at distances of 60 feet. One major contributor was Christopher Janney.[24]

- **Studio IMC**[25] in NYC had an installation at the Museum for TV & Radio in 2006 called "Beyond TV" that utilized mobile devices and video screens for people to **send messages and draw on the screens remotely** using the mobile device screen back-lighting as a "drawing pen." They've done public projects, and seem to be the sole company with several leading visions of ways to upgrade a city, unlocking untapped potential. See the "City of the Future" graphic they made."[26]

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22 http://www.dodgeball.com
23 http://www.friendstribe.com
24 http://www.janney.com
25 http://www.studioimc.com
26 http://smart-city.re-configure.org/CityofTheFuture_StudioIMC.jpg

- **eLumenati Immersive Media** (**Dome theater** displays, installations, research, & experiments)**.**[27]
- NYC, as you can imagine, now holds several events each year related to **democracy, technology, and the democratization of media** (email me for more information).
- Largest **geographic information systems group** in NYC - GISMO[28]
- **Virtual London**[29] Project, **3-D modeling of the city**. (Not falling into using this in conjunction with their defective surveillance society[30] is crucial, we don't need a 21st century dark age of accelerated paranoia and suspicion)
- **Virtual Berlin**[31]
- **Virtual Amsterdam**—"Arounder"[32] & "Panoramsterdam"[33]
- **Undersound.org**[34]—Project developed by women from California, Italy, and London to **distribute music through mobile devices and stations located in the subway system**, provoking connectivity underground which can be a place of awkward isolation.
- **Pattern Language**[35]—"Architects and Builders Rebuilding Neighborhoods/Rebuilding the Urban Geography of Earth," based on the book by Christopher Alexander.
- **"Senseable" City Lab** of M.I.T.[36]
- Interactive bus stop in Spain[37] + "smart mobility systems"[38]

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27 http://elumenati.com/
28 http://www.geo.hunter.cuny.edu/gismo
29 http://tinyurl.com/2kfotf
30 http://tinyurl.com/ypahvt
31 http://tinyurl.com/2wvuk5
32 http://amsterdam.arounder.com/
33 http://www.panoramsterdam.nl/
34 http://www.undersound.org/
35 http://www.patternlanguage.com/
36 http://senseable.mit.edu/

My idea for this would be to imagine potential "public interactive intelligence pods," or public interactive mobile pods for bus stops, trains, subways, etc. where a free exchange of creatively intelligent ideas could take place every day (and night), with diverse local and international travelers.

There are many more related links.[39] Some related ideas can be found in the presentation I did for the *Media Ecology Association Convention* at Boston College in the summer of 2006.[40]

Collective Self-Reliance

A city is entirely influenced by two colors, the green and red lights at intersections. I see this as a binary element of the urban motherboard that citizens have accepted as being a benefit to a city's health. When there is disregard of this binary opposition, as I have experienced, disaster can happen (someone running a red-light smashing into my car, not going along with the urban health 'program').

This can signify that laws and programs should co-exist to govern (and co-govern) for the **health** of people, not to control and exploit.

Cities are comprised of unbelievable amounts of design, collective workforce, historical significance, and countless memories in people's lives. People become aspects of the cities they live in. If conscious of this, I think city planners, conceptual architects, and builders have a responsibility to encode their works with this in mind. They—you and I—we—are influencing the design of people's minds and behaviors, which in turn will reflect on our reputation.

I am loosely though persistently connecting with people in the NYC region to find those in the architectural, urban planning, and technology fields. I have also been connecting with people in intelligence fields, non-governmental organizations (NGO's), and others. I do this in order to fuel the realization of the community empowerment potential in not relying excessively on government to solve problems which they have proven themselves to not be able to solve. Or to solve problems in areas in which they have been stagnating,

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[37] http://senseable.mit.edu/bus_stop
[38] http://senseable.mit.edu/biennale/smart_mobility.pdf
[39] http://link-bomb.re-configure.org
[40] http://re-configure.org/media-ecology.htm

or producing counter-productive effects on the communities they claim to serve and protect.

My theory is that forming a communications of mapped unified intelligence available and circulating in city hot-spots, can provoke immunity, building a community immune system.

The idea is to network intelligence in diverse ways to form communities of resources, pools of interest, and feedback loops. To develop formats that harness collective intelligence to help communities self-organize, and which provide strategy development for community empowerment. If persisted in, this could result in possible self-governance and could also revitalize disassociated citizens, citizens who may be willing and able to contribute their creative exploration and unique powers.

We could be "encoding" our cities with the themes of FREEDOM, INTELLIGENCE, CREATIVITY, & OPPORTUNITY, and have this become a persistent cycle.

The consciousness of so many people is ignored, and untapped, due to our existing overburdened infrastructure that lacks a welcoming integration of citizen feedback within mass communications technologies. In order for a more intelligent system to form, through the bridging of these sectors, we need top notch organizational models. We also need workers to attend to these matters, without relying excessively on either the human element or the technological element.

To me, the pursuit of a strategic communications intelligence infrastructure that supports creative explorations and contributions from a diverse citizenry is an attainable goal, and one to be seriously considered by any city, as a way to progress and advance.

Acronyms:

CUPUM = Computers for Urban Planning and Urban Management

MIT = Massachusetts Institute of Technology

GISMO = Geographic Information Systems & Mapping Operations

NASA = National Aerospace Association

MTA = Mass Transit Authority

SMS = Short Message Service

Global Vitality Report 2025: Learning to transform conflict and think together effectively[1]

Peter+Trudy Johnson-Lenz[2]

The intolerable tensions and breakdowns fueled by global implosion[3] finally forced us to take more responsibility and forge the tensions of our competing and sometimes warring interests into interdependent and adaptive intelligence before it was too late. *It became imperative to think and act together to solve the enormous problems coming at us at unprecedented rates.* It was close to the point of no return: Learn or burn.

People were becoming increasingly alarmed at the destructiveness and intensity of hardball politics and partisan argument disguised as "debate." Annihilating the other side inflamed emotions and polarized people without getting anything done. As major disruptions began to mount, the finger-pointing, name-calling, "blame game" just made matters worse. Ecosystem

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NB: This chapter is one facet of a comprehensive strategic framework for co-intelligently informing, coordinating, and accelerating action and innovation to solve difficult societal problems. For a sketch of the principles and design of such a framework, please see "Points of greatest influence," a bonus chapter in the free online version of this book at earth-intelligence.net/CIB and also available at http://www.johnson-lenz.com/points of greatest influence.doc

[1] This backcast from 2025, web published in 2005, is one of the themes in CoFutures, a prototype vision and strategic framework for realizing a smart future that is prosperous, sustainable, fair, free, and secure. http://johnson-lenz.com/n=cofutures

[2] Peter+Trudy Johnson-Lenz help organizations anticipate and adapt transformative innovations for a smart future through futures research and collaborative process design. http://johnson-lenz.com

[3] http://johnson-lenz.com/n=global%20implosion

destruction[4] and natural resource shortages were particularly difficult issues to resolve because they tended to result in intractable conflicts[5] over values, resource distribution, and power.

In conjunction with the *UN's International Year of Civil Society 2010*, the grassroots campaign "Put 'Civil' Back in Civil Society" began to offer conflict resolution workshops along with CPR training as essential first aid and preparedness for resilient communities.

People learned to map and mobilize *The Third Side*[6] to transform conflicts, even though it was often difficult. They learned Center for Nonviolent Communication[7] skills, community problem-solving, and "getting to yes" methods they could immediately use at home, in school, at work, and in their communities. These methods had been developed and honed in the last quarter century.

The campaign expanded to make widespread use of peer conflict mediation programs in schools and workplaces. *Without being able to de-escalate and mediate conflict as it was happening, people wouldn't be able to transform it and use it constructively.*

The Conversation Café[8] movement, seeded in the summer of 2001 in the US, went global in 2007, bringing people together in small groups in coffee shops and other public places around the world for real conversations in a safe, supportive environment. As they said, "Tired of small talk? Try some BIG talk."

In parallel, the World Café[9] provided a simple and elegant method for groups large and small to focus on the conversations that matter and then quickly cross-fertilize their insights for collective intelligence. It's practiced worldwide in many settings.

[4] http://johnson-lenz.com/n=millennium%20ecosystem%20assessment
[5] http://johnson-lenz.com/k=1000-166-21
[6] http://johnson-lenz.com/k=0300-255-10
[7] http://johnson-lenz.com/k=1000-308-21
[8] http://johnson-lenz.com/k=1000-615-21
[9] http://www.theworldcafe.com/

Gradually, like the no smoking campaigns of the last century, truly uncivil behavior largely went out of fashion, at least in big pockets of the population. Of course, the art of the perfect putdown remained alive and well, and just the right amount of attitude kept things nice and spicy.

Meanwhile, globalization's expanding reach, while causing further disruptions, also provided the global standard communications infrastructure through which the movement grew strong enough to help reframe the role of leading transnational organizations within the larger context of our mutual interdependence.

Some large institutions and national governments continued to dominate public discourse, focusing and polarizing a narrow range of issues. Only later, when massive disruptions threatened their very survival did they begin to shift from simple competitive self-interest to complex interdependent self-interest.

In the past 25 years, great strides have been made in business and industry to embrace risk management, crisis preparedness, and decision-making under uncertainty. Those frameworks and methods are now much more widely adopted and used by governments and communities as well.

Organizations have also shifted from command-and-control hierarchical structures to a variety of decentralized[10] structures, including loose hierarchies, democracies, and internal and external markets. This shift was made possible by cheap information and communications systems that have flattened our world and transformed the world of work.

The need to collaborate finally taught us the wisdom of practicing conflict resolution, conflict transformation, policy consensus[11], constructive confrontation[12], dialogue and deliberation[13], and the Golden Rule[14]. Many different approaches and processes have been developed and used since the 1960s, and our knowledge of what works best in which situations is getting much more sophisticated. Wisdom Councils[15] and citizens juries[16] now

[10] http://johnson-lenz.com/k=1000-172-21
[11] http://johnson-lenz.com/k=0300-096-10
[12] http://johnson-lenz.com/k=1000-166-21
[13] http://johnson-lenz.com/k=1000-167-21
[14] http://johnson-lenz.com/k=1000-217-21
[15] http://johnson-lenz.com/k=1000-581-21
[16] http://johnson-lenz.com/k=1000-580-21

routinely advise governments worldwide, from local to national. The transpartisan movement[17] in the US bridged the ideological gaps and helped reunite America[18].

The new Tough Choices Policy Consensus Systems now *involve broad sectors of society in considering the competing interests, values, and tradeoffs in societal issues.* These include choosing which of life's forms to create and sustain, making ethical choices about the uses of advanced technologies, providing for human needs while restoring ecosystems that support those needs, orienting technological development, and more. These systems use professional staff and engagement technologies to frame issues, develop knowledge, and suggest and facilitate methods to support robust citizen deliberation. While not legally binding, these citizen recommendations are very influential and help build necessary political will.

Elements of the Tough Choices System for broad societal deliberation:

- *Inquiry teams* constantly scan the environment; monitor changes and trends; gather data, information, stories, and lore about what's happening; frame emergent issues; converse and deliberate; and generate knowledge about key societal issues.
- *Weaving teams* organize the knowledge from inquiry teams by looking for patterns and identifying perspectives, agreements, disagreements, and connections to past conditions and future goals.
- *Policy teams* use the organized knowledge for their deliberations, make tough choices and develop policy recommendations, identify desired outcomes, and develop benchmark indicators of progress.
- *Benchmark teams* track the implementation of policies using the benchmarks to measure progress towards objectives, note successes and failures, and suggest changes for improvement.

[17] http://johnson-lenz.com/k=1000-578-21
[18] http://johnson-lenz.com/k=1000-579-21

- *Bootstrap teams*, discovered and named by groupware pioneer Douglas C. Engelbart, watch the knowledge system in action, note how well it's working and where the new engagement technologies help and hinder, specify the next generation of technology tools, and ensure continuous improvement in the system itself.

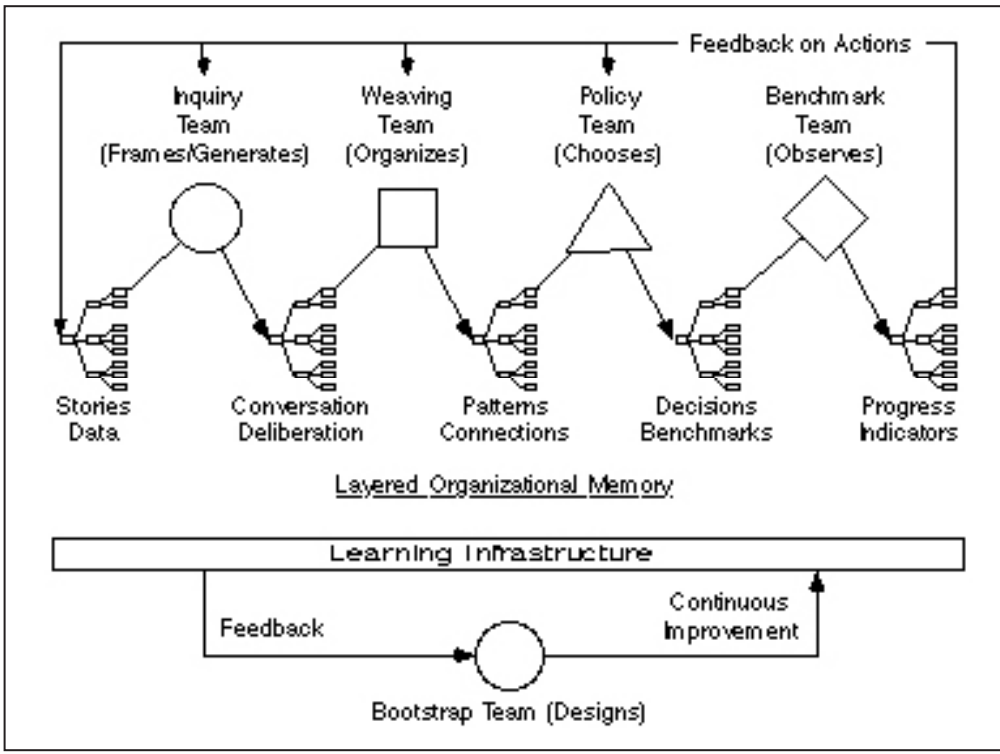

Figure 1: Tough Choices Policy Consensus Systems

Finally, *we're learning to practice co-intelligence*[19] *— being smarter and wiser together than any of us can be alone.* The Co-intelligence Institute[20] has been a major contributor to this positive development.

[19] http://johnson-lenz.com/n=What%20is%20co-intelligence%3F&kid=1000-170-21
[20] http://johnson-lenz.com/n=The%20Co-Intelligence%20Institute&kid=1000-169-21

Attentional capital and the ecology of online social networks

Derek Lomas[1]

The evolution of the Internet has enabled millions of independent minds from around the world to coordinate their attention to form bottom-up (emergent) systems for media production, evaluation, and distribution.

Picture 1. This scientific visualization 'stains' some Myspace pages white to indicate the presence of a viral image. Size of balls indicates popularity

Some of the primary drivers of this new media landscape are online social networks, such as Myspace.com, which have made participation in virtual communities a ubiquitous part of growing up in America. Digital media

[1] *The Social Movement Laboratory* at the California Institute for Telecommunications and Information Technology (Calit2), UC San Diego. Collaborators include Todd Margolis, Jared Chandler, Jurgen Schultz, Ruth West and Andres Valencia. www.socialmovement.org.

exchanges are now a common element of typical social interactions among the youth of America.

New Tools for Studying Large Scale Online Social Activity

The Social Movement Laboratory, at the California Institute of Telecommunications and Information Technology (Calit2) is developing an experimental prototype to assist very-large-scale ethnographic studies of the structure and dynamics of social activity within Myspace.com, the world's largest online social network. Picture 1 shows part of an interactive 20-screen display used to visualize the distribution of "viral" media and exchanges of attention within the rich cultural ecology of online social networks. This essay describes several of the concepts we aim to illustrate with our future studies.

Background: The Evolution of Digital Media

Over the past decade, tools for media production have expanded in power and have drastically fallen in price. Non-experts can use a $1000 computer to create graphics, music, films, and complex interactive programs. The abundance of mobile phones with digital video capture is but one instance of the power and ease of contemporary digital media production. The massive collective creation and recombination of digital media represents a significant cultural shift from the dominant centralized media industries of the 20th century.

Yet, the recent democratization of media production is hardly the only story. Just as important are the radically efficient new mechanisms for media distribution. The 20th century media distribution systems—movie theaters, record production factories or TV broadcast towers—were too expensive to be used by average citizens. The Internet changed this, enabling free publishing of personal media. But the past 4 years have seen a significant shift even within the Internet, as websites (like Myspace) facilitating the social distribution of digital media have radically transformed the topology of media flow in society.

Prior to mass media, information traveled via word of mouth, according to the topology (or structure) of social networks. The capital-intensive material constraints of 20th century film, music, and news all necessitated that media distribution take place in a centralized form, for efficiency of mass production. But digital technologies enable media to be copied at no cost. Therefore, the engine for media distribution no longer requires massive capital expenditure, Now, in addition to the shaken, but still dominant, centralized media networks

(i.e. Cable TV, Hollywood, music labels) purely social mediums are distributing media en masse. The exchange of digital media (images, videos, music) is now a basic discursive element of typical human social interaction.

Attentional Capital and the Competition for Human Cognition

If we treat media objects like organisms, the current ecological conditions described above have resulted in a period of rapid proliferation, mutation and evolution—a sort of Cambrian era, as it were. Constraining this media ecology is the competition for the one scarce resource that all media objects need for reproductive success: *your undivided attention*.

Human attention is a scare resource and an economic value of immense (but rarely measured) significance. That attention can be considered a capital resource is apparent when considering how much how much money advertisers expend to obtain it, or how much money you have to pay doctors or lawyers to pay attention to you. The capital value of attention results from its scarcity, which itself results from the inability of individuals to effectively focus on more than one thing at a time. (Watching 3 films at once might be *possible*, but it is hardly advisable).

The ability to attract and engage the attention of other people is a critical and defining characteristic of success within human society—necessary for reproduction, friendship, employment, and political power. We sell our attention for cash when we go to work, and the goods we buy at the grocery store are simply the end-products of a long chain of other people's attention.

So, what is Attention, exactly? Colloquially, it is often used interchangeably with "time" or "work". We know that to properly experience a film, we must "pay attention" to it. From a Cognitive Science perspective, Attention can be defined as *the mechanism by which we become momentarily conscious of a set of elements (and their relations) in the world around us, though the unified employment of our cognitive resources.* How many "elements" can we pay attention to at a time? Psychology traditionally maintains a magic number of 7, plus or minus two. But the common reality is that our cognitive faculties can really only *consciously process* one task at a time (Driving while text messaging notwithstanding). Additionally, we can only really pay attention to one person (or conversation) at a time. So when you have the attention of another person, it's their whole mind that has been made available to you.

Attention is a critical issue in media studies, because in our current age it is no longer the material limitations that govern the overall movement of media, but our own attentional constraints. As media relies upon a limited pool of human attention for its production and replication, a sort of natural selection is taking place (survival of the relevant?). Yet, just as media competes for placement in our mind, humans compete for attention at an even greater scale.

We compete for attention because it is a fundamentally valuable resource in human society. Any collaborative activity requires the attraction and coordination of human attention. Insofar as collaboration creates additional value, it will benefit those individuals who are skilled at engaging the attention of others. As a result, we spend a significant amount of time developing our own skills and strategies for gaining and maintaining other people's attention. This seems to be why people spend hours and hours adjusting their self-representation on Myspace.com, and daily post funny comments, pictures and videos on the pages of their friends.

Reciprocity and Human Society

Long before it was common to exchange digital media, humans used the power of physical media to engage the attention of others: consider our investments in stylish clothes, dinner parties, expensive cars, greeting cards and well-delivered stories told at parties. These each require an investment of our own attention, and whether directly or indirectly, will tend to result in a positive net increase in the amount of attention other people are willing to expend on us.

Conversational exchanges can be described as a reciprocal flow of listening to the thoughts of others and sharing one's own. Someone smiles, and we smile back. There are social consequences for not reciprocating a friendly wave, a holiday present, or a letter. However, reciprocity is rarely tightly coupled, in the sense of a direct payback for a gift or gesture. For instance, in older times the tendency to reciprocate food resources enabled social groups to remain cohesive and strong—but food was not always repaid with food but with social deference and respect. Indeed, Anthropologists have created a rich literature concerning 'gift economies' and its relationship to social prestige within human societies. By tracking gifts and gestures, we can illustrate and articulate the strength of social bonds between people. Exchanges of attention, as a capital value, can be used similarly, to articulate networks of social relationships. Our project aims to do this using data from Myspace.com.

Social Informatics, Online Ethnography, and Myspace.com

Myspace is the largest online social network (virtual community) as of late 2007, with close to 100 million regular users worldwide. Like most social networks, users create pages that represent their identity and create networks of links to other users by adding them as 'friends.' With Friendster (a popular social network that peaked in 2004) this got boring, but Myspace introduced 'commenting' which became the predominant social activity. "Comments" are messages, images, video and other media objects that can be posted on a friend's page and can be seen by everyone. When a person writes a comment, they are investing attention in the recipient, and so by tracking the pattern of commenting on Myspace, we can articulate rich, meaningful networks of attentional exchange within Myspace. We recognize that while rich in possibility and practice, the social environment of Myspace is far simpler than real-world engagements. Nevertheless, the simplicity of these (now) natural online interactions offers an opportunity to conceptually disentangle the incredibly complicated nature of human social relationships.

Indeed, the study of online social networks offers an incredible opportunity to gather both quantitative and qualitative information about the nature of human social behavior. Offline social behavior is difficult to capture and objectively analyze, whereas online interactions are discrete actions naturally recorded in a digital medium. Because these social behaviors are enacted within a database, the natural properties of databases are available to social research—such as search, numeric analysis, abstraction, etc.

The computational techniques used to analyze databases of social behavior comprise the emergent discipline of Social Informatics. These techniques were useful to capture and quantify large numbers of common social activities, illustrate the structure and dynamics of attentional exchange, and visualize the distribution and diversity of digital media. However, software can never substitute for direct engagement with users and extended ethnographic observation. In the Fall of 2005, inspired by Ed Hutchins, I began conducting a "Cognitive Ethnography" of the use of Myspace.com—these efforts laid the conceptual groundwork for my further studies.

By the spring of 2006, we managed to capture the social activity occurring on the pages of nearly 1 million Myspace Pages using a web-

spider developed by collaborators of the Social Movement Laboratory (a hybrid art-science laboratory at the California Institute of Telecommunications and Information Technology).[2] With help from the San Diego Supercomputing Center (SDSC), we successfully produced visualizations of attentional exchanges on Myspace and the uncanny, life-like spread of digital media within the network.

Identity Signals and the Coordination of Cultural Values

When users join Myspace.com they create a "user profile"—essentially a mini-biography detailing their interests and personality. The profile allows users to express their identity through representations of their interests, values, and aesthetics, what Judith Donath calls "Identity Signals". These representations include personal photographs as well as images, video, music and other Internet media. Users often spend hours changing their profile, and try to get just the right mix of design and 'casualness' (users report that they will conceal how much time or effort is put into their page by having 'strategic sloppiness').

Myspace helps participants coordinate their cultural identity by allowing identity signals to be easily produced, exchanged and evaluated by peer networks. The remixing of media to generate an identity could be compared to a person choosing an outfit or hairstyle. These "dressed-up" profiles and their "identity signals" enable other users to gain an *empathic sense* for the represented user's character and personality. The profile can then assume the role of a proxy, a digital "self" that can meet up with friends 24/7.

Self-representation is not conducted just for its own sake, but as a mechanism to control the types of people and interactions desired by a user. Different constellations of identity signals are employed to capture the attention of select groups of people. Some traits indicate the presence of a much larger set of cultural affinities than is directly shown, such as when a user wears a du rag in their profile picture and plays "50 Cent" on their page or when a user wears heavy black eyeliner and shows pictures of dungeons. We tend to communicate with other people who share our cultural attitudes and interests, as communication is easier when we share common cultural frames of reference. Myspace enables users to coordinate their cultural values through the display and exchange of media. These exchanges solidify the cultural identity

[2] www.socialmovement.org

of a group of people by creating common references and by providing an opportunity for the evaluation of cultural elements, such as when friends play each other music or recommend films. Whenever users post language, images or other media, it becomes available for mass cultural evaluation.

Reciprocal Commenting

Comments can be thought of as the "the thought that counts" behind any good gift. Although they are insubstantial and represent no material value, they do represent the expenditure of time and energy that the giver has invested in the recipient. Furthermore, comments act as a 'public display of attention' a user's prestige can be enhanced by the quantity and quality of comments posted on their page.

Users report that getting comments feels good—in fact, one user said it was like a drug, because she felt she was addicted to a continual stream of comments. It is not entirely clear why users "feel good" when they receive comments, but it certainly means that other people were thinking about them. Regardless, they do feel good when they get such "gifts of attention." Because they feel good, comments tend to be reciprocal. Many users know that by posting comments onto other people's pages, they will likely receive comments back. New users quickly learn to comment frequently on other people's pages to increase the number of comments they themselves receive. Users who do not reciprocate comments are less likely to receive them in the future.

This reciprocal system is the basis for the movement of media throughout Myspace. When a user receives a picture or video from another person, they are more likely to pass this on to other friends at a later time. The rapid growth of YouTube, the largest online video exchange service (bought by Google for $1.65 billion), is generally accredited to Myspace users, who developed the practice of copying and pasting embed codes to share media with their friends. Furthermore, by posting media onto a person's page, if relevant to the recipient, it is far more likely to be found relevant by the friends of that recipient. That friend might again copy and paste the video onto another friend's page. And so on. The human tendency to reciprocate, discussed earlier, has resulted in a highly efficient collective system for the distribution of digital media.

Comments and the Collective Production of Individual Identity

A person's Myspace page is meant to act as a representation of their identity, but 3/4s of their page is not created by themselves, but by their friends—

through the posting of comments. After all, “in real life,” an individual's friends can be considered a strong indication of who they are. On Myspace, a person’s identity is revealed in a manner that cannot be faked simply because communication between friends is performed publicly. For example, if friends post racist jokes on a user’s page, this can indicates a great deal about the person. Because comments cannot easily be faked, their quantity and quality are important indicators of a person’s social value (and indeed, whether the profile represents a real person at all!).

The Mass Analysis of Comments

The discrete, quantitative nature of comments is useful to large-scale representations of attentional flows. The total number of comments a person has received is a rough indicator of the total amount of attention received by a person, whereas the temporal frequency of comments is an indicator of how popular a person is at any given time. Qualitatively, the uniqueness of comments can provide a rich source of information about the person’s identity and prestige.

> Hiya there! How ya been sexyman?! Looking forward to Xmas?
>
> LUV THE PIC!! VERY CREATIVE. AN INTERESTING FRAME FOR AN * INTERESTING FACE. :)
>
> THANKS 4 THE ADD JOE...HAPPY HOLIDAYS
>
> not shit....u?
>
> Thanks for the ad, Joe! I hope you have a great weekend my friend!
>
> Hello (smile).... Thank you for the request. Have a great one... Mahogany.
>
> ayy u goin 2 skoo 2moro,u betta,cuz i fogot u kno we had 2 do dat essay thing n its worth a test grade,lol,i lost my paper fo it n errythang 2 ima fail,lol
>
> hey DUM.... i thought u was go take dis of yo page... wipe
>
> Hey Gurl Wat R U Doin At Home Tonight Didnt Yall Have Yall Homecomin??
>
> hey chelle whats goin on hun... i aint been on ya page in a while cuz'n so get at me ok and call me sometime dont act like u den 4got da numba either
>
> wud up???? whas good wit u mah bads at da game i aint even kno it was u all i saw was sierra lol but jus returnin da luv dat u showed me
>
> teardrop~
>
> Murd bak up, this my wifie rite herre, an u cnt hve her rite ma?

Endless lists of acknowledgements and thanks appear to be the norm with textual comments. It may be somewhat disturbing to discover, after viewing thousands and thousands of Myspace pages, that comments very rarely contain any sort of intellectual content. Again, they seem to act primarily as a way of coordinating cultural values and social identity.

Future Studies with Social Informatics

This work makes me believe that "Social Informatics" could someday help illuminate properties of human cognition (which is fundamentally social and collective in form) in a manner even more meaningful than an fMRI scan. For instance, it could show the evolution and distribution of new linguistic elements, simply by gathering a large enough sample. The characteristics that make media or people popular can be investigated. The evolution of media forms, social groups, and even individual people, can be charted through time.

However, this work also raises the issue of governments and corporations conducting similar large-scale social analyses on open networks like Myspace, and hopefully this project can raise reasonable concerns around this issue. I expect that machine learning will become a primary technique of Social Informatics, making it likely that corporations will someday determine which identity signals make a person likely to buy product. More questionably, it is certainly foreseeable that machine learning could identify individuals at risk for suicide or those who are "statistically more likely to commit violent crimes". Hopefully an investment of academic research into these tools will help set the stage for an ethical debate about these issues.

Conclusion: Design Recommendations

Millions of youth are spending billions of leisure hours developing relationships with one another online. However, in contrast to many previous virtual communities, it is rare that any academic, intellectual or political issues are discussed in earnest. While socializing seems inherently valuable, should this just consist of perfecting one's image, sharing funny pictures and maintaining ties with casual acquaintances? Social network users do occasionally engage social issues; say by joining "Save Darfur" groups or adding "The Environment" to their top 8 friends. While these acts are discursive in their own right, the fact remains that it is hard to find any thoughtful discussion on popular online social networks. There are myriad places, online, where meaningful, sustained discussions do take place. So why

is it that social networks tend to inhibit users from interacting with their peers in a more substantive fashion? Five explanations seem plausible:

The Lowest Common Denominator Theory: Many people, even the majority of people, don't seem to like having intellectual conversations, preferring gossip and playful banter. If a person doesn't have intellectual conversations in person, they are unlikely to do so online.

The Social Norms Theory: When users join social networks, they immediately become witness to the content of the many visible social interactions therein. Just as walking into a keg party will reduce one's likelihood to talk about foreign affairs, online socializers quickly develop an internal sense of what is 'proper' social activity in the online space.

The Online Noise Theory: The intensity of the competition for attention within online social networks has reached a point where people feel utterly saturated—the pull of people and media is so strong in every direction that one does not have the time or energy to invest in meaningful issues or relationships: social-information overload.

The Social Architectures Theory: As Mitch Kapor says, "Architecture is Politics." The structure of online social networks is responsible for the types of conversations people can have. Online venues for sustained discussions, if present at all within social networking sites, are often out-of-the way and secondary to features that facilitate identity and relationship formation (profiles and comments). Successful online communities owe their success, in part, to the design of the medium of the community.

The Procrastination Theory: People use online social networks specifically as a way to procrastinate. Somehow, productive discussion is not in the spirit of procrastination.

Whatever the reason, the lack of substance in these exchanges can usefully be critiqued. Could "Social Design" principles be developed that would promote a more productive social ecology that encourages meaningful discussion within these existing online social environments? Insofar as the lack of intellectual discourse is an cultural trend, we should consider the repercussions of having the wealthiest youth in the world spending their time in ultimately barren pursuits. There are far too many serious issues in the world that could be solved, given the proper allocation of human attention.

A slice of life in my virtual community

Howard Rheingold[1]

I'm a writer, so I spend a lot of time alone in a room with my words and my thoughts. On occasion, I venture outside to interview people or to find information. After work, I reenter the human community, via my family, my neighborhood, my circle of acquaintances. But that regime left me feeling isolated and lonely during the working day, with few opportunities to expand my circle of friends. For the past seven years, however, I have participated in a wide-ranging, intellectually stimulating, professionally rewarding, sometimes painful, and often intensely emotional ongoing interchange with dozens of new friends, hundreds of colleagues, thousands of acquaintances. And I still spend many of my days in a room, physically isolated. My mind, however, is linked with a worldwide collection of like-minded (and not so like-minded) souls: My virtual community.

Virtual communities emerged from a surprising intersection of humanity and technology. When the ubiquity of the world telecommunications network is combined with the information-structuring and storing capabilities of computers, a new communication medium becomes possible. As we've learned from the history of the telephone, radio, television, people can adopt new communication media and redesign their way of life with surprising rapidity. Computers, modems, and communication networks furnish the technological infrastructure of computer-mediated communication (CMC); cyberspace is the conceptual space where words and human relationships, data and wealth and power are manifested by people using CMC technology; virtual communities are cultural aggregations that emerge when enough people bump into each other often enough in cyberspace.

[1] Then Editor, *The Whole Earth Review*. In 1988, *Whole Earth Review* published my article, "Virtual Communities." Four years later, I reread it and realized that I had learned a few things, and that the world I was observing had changed. So I rewrote it.

A virtual community as they exist today is a group of people who may or may not meet one another face to face, and who exchange words and ideas through the mediation of computer bulletin boards and networks. In cyberspace, we chat and argue, engage in intellectual intercourse, perform acts of commerce, exchange knowledge, share emotional support, make plans, brainstorm, gossip, feud, fall in love, find friends and lose them, play games and metagames, flirt, create a little high art and a lot of idle talk. We do everything people do when people get together, but we do it with words on computer screens, leaving our bodies behind. Millions of us have already built communities where our identities commingle and interact electronically, independent of local time or location. The way a few of us live now might be the way a larger population will live, decades hence.

The pioneers are still out there exploring the frontier, the borders of the domain have yet to be determined, or even the shape of it, or the best way to find one's way in it. But people are using the technology of computer-mediated communications CMC technology to do things with each other that weren't possible before. Human behavior in cyberspace, as we can observe it and participate in it today, is going to be a crucially important factor. The ways in which people use CMC always will be rooted in human needs, not hardware or software.

If the use of virtual communities turns out to answer a deep and compelling need in people, and not just snag onto a human foible like pinball or pac-man, today's small online enclaves may grow into much larger networks over the next twenty years. The potential for social change is a side-effect of the trajectory of telecommunications and computer industries, as it can be forecast for the next ten years. This odd social revolution -- communities of people who may never or rarely meet face to face -- might piggyback on the technologies that the biggest telecommunication companies already are planning to install over the next ten years.

It is possible that the hardware and software of a new global telecommunications infrastructure, orders of magnitude more powerful than today's state of the art, now moving from the laboratories to the market, will expand the reach of this spaceless place throughout the 1990s to a much wider population than today's hackers, technologists, scholars, students, and enthusiasts.

The age of the online pioneers will end soon, and the cyberspace settlers will come en-masse. Telecommuters who might have thought they were just working from home and avoiding one day of gridlock on the freeway will find themselves drawn into a whole new society. Students and scientists are already there, artists have made significant inroads, librarians and educators have their own pioneers as well, and political activists of all stripes have just begun to discover the power of plugging a computer into a telephone. When today's millions become tens and hundreds of millions, perhaps billions, what kind of place, and what kind of model for human behavior will they find?

Today's bedroom electronic bulletin boards, regional computer conferencing systems, global computer networks offer clues to what might happen when more powerful enabling technology comes along.

The hardware for amplifying the computing and communication capacity of every home on the world-grid is in the pipeline, although the ultimate applications are not yet clear. We'll be able to transfer the Library of Congress from any point on the globe to any another point in seconds, upload and download full-motion digital video at will.

But is that really what people are likely to do with all that bandwidth and computing power? *Some of the answers have to come from the behavioral rather than the technological part of the system.* How will people actually use the desktop supercomputers and multimedia telephones that the engineers tell us we'll have in the near future.

One possibility is that people are going to do what people always do with a new communication technology: use it in ways never intended or foreseen by its inventors, to turn old social codes inside out and make new kinds of communities possible. CMC will change us, and change our culture, the way telephones and televisions and cheap video cameras changed us -- by altering the way we perceive and communicate. Virtual communities transformed my life profoundly, years ago, and continue to do so.

A Cybernaut's Eye View

The most important clues to the shape of the future at this point might not be found in looking more closely at the properties of silicon, but in paying attention to the ways people need to, fail to, and try to communicate with one another. Right now, some people are convinced that spending hours a day in front of a screen, typing on a keyboard, fulfills in some way our need for a

community of peers. Whether we have discovered something wonderful or stumbled into something insidiously unwonderful, or both, the fact that people want to use CMC to meet other people and experiment with identity are valuable signposts to possible futures.

Human behavior in cyberspace, as we can observe it today on the nets and in the BBSs, gives rise to important questions about the effects of communication technology on human values. What kinds of humans are we becoming in an increasingly computer-mediated world, and do we have any control over that transformation? How have our definitions of "human" and "community" been under pressure to change to fit the specifications of a technology-guided civilization?

Fortunately, questions about the nature of virtual communities are not purely theoretical, for there is a readily accessible example of the phenomenon at hand to study. Millions of people now inhabit the social spaces that have grown up on the world's computer networks, and this previously invisible global subculture has been growing at a monstrous rate recently (e.g., the Internet growing by 25% per month).

I've lived here myself for seven years; the WELL and the net have been a regular part of my routine, like gardening on Sunday, for one sixth of my life thus far. My wife and daughter long ago grew accustomed to the fact that I sit in front of my computer early in the morning and late at night, chuckling and cursing, sometimes crying, about something I am reading on the computer screen. The questions I raise here are not those of a scientist, or of a polemicist who has found an answer to something, but as a user -- a nearly obsessive user -- of CMC and a deep mucker-about in virtual communities. What kind of people are my friends and I becoming? What does that portend for others?

If CMC has a potential, it is in the way people in so many parts of the net fiercely defend the use of the term "community" to describe the relationships we have built online. But fierceness of belief is not sufficient evidence that the belief is sound. Is the aura of community an illusion? The question has not been answered, and is worth asking. I've seen people hurt by interactions in virtual communities. Is telecommunication culture capable of becoming something more than what Scott Peck calls a "pseudo-community," where people lack the genuine personal commitments to one another that form the bedrock of genuine community? Or is our notion of "genuine" changing in an age where more people every day live their lives in increasingly artificial environments? New

technologies tend to change old ways of doing things. Is the human need for community going to be the next technology commodity?

I can attest that I and thousands of other cybernauts know that what we are looking for, and finding in some surprising ways, is not just information, but instant access to ongoing relationships with a large number of other people. Individuals find friends and groups find shared identities online, through the aggregated networks of relationships and commitments that make any community possible. But are relationships and commitments as we know them even possible in a place where identities are fluid? The physical world, known variously as "IRL" ("In Real Life"), or "offline," is a place where the identity and position of the people you communicate with are well known, fixed, and highly visual. In cyberspace, everybody is in the dark. We can only exchange words with each other -- no glances or shrugs or ironic smiles. Even the nuances of voice and intonation are stripped away. On top of the technology-imposed constraints, we who populate cyberspace deliberately experiment with fracturing traditional notions of identity by living as multiple simultaneous personae in different virtual neighborhoods.

We reduce and encode our identities as words on a screen, decode and unpack the identities of others. The way we use these words, the stories (true and false) we tell about ourselves (or about the identity we want people to believe us to be) is what determines our identities in cyberspace. The aggregation of personae, interacting with each other, determines the nature of the collective culture. Our personae, constructed from our stories of who we are, use the overt topics of discussion in a BBS or network for a more fundamental purpose, as means of interacting with each other. And all this takes place on both public and private levels, in many-to-many open discussions and one-to-one private electronic mail, front stage role-playing and backstage behavior.

When I'm online, I cruise through my conferences, reading and replying in topics that I've been following, starting my own topics when the inspiration or need strikes me. Every few minutes, I get a notice on my screen that I have incoming mail. I might decide to wait to read the mail until I'm finished doing something else, or drop from the conference into the mailer, to see who it is from. At the same time that I am participating in open discussion in conferences and private discourse in electronic mail, people I know well use "sends" -- a means of sending one or two quick sentences to my screen without the

intervention of an electronic mail message. This can be irritating before you get used to it, since you are either reading or writing something else when it happens, but eventually it becomes a kind of rhythm: different degrees of thoughtfulness and formality happen simultaneously, along with the simultaneous multiple personae. Then there are public and private conferences that have partially overlapping memberships. CMC offers tools for facilitating all the various ways people have discovered to divide and communicate, group and subgroup and regroup, include and exclude, select and elect.

When a group of people remain in communication with one another for extended periods of time, the question of whether it is a community arises. Virtual communities might be real communities, they might be pseudo-communities, or they might be something entirely new in the realm of social contracts, but I believe they are in part a response to the hunger for community that has followed the disintegration of traditional communities around the world.

Social norms and shared mental models have not emerged yet, so everyone's sense of what kind of place cyberspace is can vary widely, which makes it hard to tell whether the person you are communicating with shares the same model of the system within which you are communicating. Indeed, the online acronym YMMV ("Your Mileage May Vary") has become shorthand for this kind of indeterminacy of shared context. For example, I know people who use vicious online verbal combat as a way of blowing off steam from the pressures of their real life -- "sport hassling" -- and others who use it voyeuristically, as a text-based form of real-life soap-opera. To some people, it's a game. And I know people who feel as passionately committed to our virtual community and the people in it (or at least some of the people in it) as our nation, occupation, or neighborhood.

Whether we like it or not, the communitarians and the venters, the builders and the vandals, the egalitarians and the passive-aggressives, are all in this place together. The diversity of the communicating population is one of the defining characteristics of the new medium, one of its chief attractions, the source of many of its most vexing problems.

Is the prospect of moving en-masse into cyberspace in the near future, when the world's communication network undergoes explosive expansion of bandwidth, a beneficial thing for entire populations to do? In which ways might the growth of virtual communities promote alienation? How might virtual

communities facilitate conviviality? Which social structures will dissolve, which political forces will arise, and which will lose power? These are questions worth asking now, while there is still time to shape the future of the medium. In the sense that we are traveling blind into a technology-shaped future that might be very different from today's culture, direct reports from life in different corners of the world's online cultures today might furnish valuable signposts to the territory ahead.

Since the summer of 1985, I've spent an average of two hours a day, seven days a week, often when I travel, plugged into the WELL (Whole Earth 'Lectronic Link) via a computer and a telephone line, exchanging information and playing with attention, becoming entangled In Real Life, with a growing network of similarly wired-in strangers I met in cyberspace. I remember the first time I walked into a room full of people (IRL) whose faces were completely unknown to me, but who knew many intimate details of my history, and whose own stories I knew very well. I had contended with these people, shot the breeze around the electronic water cooler, shared alliances and formed bonds, fallen off my chair laughing with them, become livid with anger at these people, but I had not before seen their faces.

I found this digital watering hole for information-age hunters and gatherers the same way most people find such places -- I was lonely, hungry for intellectual and emotional companionship, although I didn't know it. While many commuters dream of working at home, telecommuting, I happen to know what it's like to work that way. I never could stand to commute or even get out of my pajamas if I didn't want to, so I've always worked at home. It has its advantages and its disadvantages. Others like me also have been drawn into the online world because they shared with me the occupational hazard of the self-employed, home-based symbolic analyst of the 1990s -- isolation. The kind of people that Robert Reich calls "symbolic analysts" are natural matches for online communities: programmers, writers, freelance artists and designers, independent radio and television producers, editors, researchers, librarians. People who know what to do with symbols, abstractions, and representations, but who sometimes find themselves spending more time with keyboards and screens than human companions.

I've learned that virtual communities are very much like other communities in some ways, deceptively so to those who assume that people who communicate via words on a screen are in some way aberrant in their

communication skills and human needs. And I've learned that virtual communities are very much not like communities in some other ways, deceptively so to those who assume that people who communicate via words on a screen necessarily share the same level of commitment to each other in real life as more traditional communities. Communities can emerge from and exist within computer-linked groups, but that technical linkage of electronic personae is not sufficient to create a community.

Social Contracts, Reciprocity, and Gift Economies in Cyberspace

The network of communications that constitutes a virtual community can include the exchange of information as a kind of commodity, and the economic implications of this phenomenon are significant; the ultimate social potential of the network, however, lies not solely in its utility as an information market, but in the individual and group relationships that can happen over time. When such a group accumulates a sufficient number of friendships and rivalries, and witnesses the births, marriages, and deaths that bond any other kind of community, it takes on a definite and profound sense of place in people's minds. Virtual communities usually have a geographically local focus, and often have a connection to a much wider domain. The local focus of my virtual community, the WELL, is the San Francisco Bay Area; the wider locus consists of hundreds of thousands of other sites around the world, and millions of other communitarians, linked via exchanges of messages into a meta-community known as "the net."

The existence of computer-linked communities was predicted twenty years ago by *J.C.R. Licklider* and *Robert Taylor*, who as research directors for the Department of Defense, set in motion the research that resulted in the creation of the first such community, the ARPAnet: "What will on-line interactive communities be like?" Licklider and Taylor wrote, in 1968: "In most fields they will consist of geographically separated members, sometimes grouped in small clusters and sometimes working individually. They will be communities not of common location, but of common interest..."

My friends and I sometimes believe we are part of the future that Licklider dreamed about, and we often can attest to the truth of his prediction that "life will be happier for the on-line individual because the people with whom one interacts most strongly will be selected more by commonality of interests and goals than by accidents of proximity." I still believe that, but I also know that

life also has turned out to be unhappy at times, intensely so in some circumstances, because of words on a screen. Events in cyberspace can have concrete effects in real life, of both the pleasant and less pleasant varieties. Participating in a virtual community has not solved all of life's problems for me, but it has served as an aid, a comfort and an inspiration at times; at other times, it has been like an endless, ugly, long-simmering family brawl.

I've changed my mind about a lot of aspects of the WELL over the years, but the "sense of place" is still as strong as ever. As Ray Oldenburg revealed in "The Great Good Place," there are three essential places in every person's life: the place they live, the place they work, and the place they gather for conviviality. Although the casual conversation that takes place in cafes, beauty shops, pubs, town squares is universally considered to be trivial, "idle talk," Oldenburg makes the case that such places are where communities can arise and hold together. When the automobile-centric, suburban, high-rise, fast food, shopping mall way of life eliminated many of these "third places," the social fabric of existing communities shredded. It might not be the same kind of place that Oldenburg had in mind, but so many of his descriptions of "third places" could also describe the WELL.

The feeling of logging into the WELL for just a minute or two, dozens of times a day is very similar to the feeling of peeking into the cafe, the pub, the common room, to see who's there, and whether you want to stay around for a chat. Indeed, in all the hundreds of thousands of computer systems around the world that use the UNIX operating system, as does the WELL, the most widely used command is the one that shows you who is online. Another widely used command is the one that shows you a particular user's biography.

I visit the WELL both for the sheer pleasure of communicating with my newfound friends, and for its value as a practical instrument for gathering information on subjects that are of momentary or enduring importance, from child care to neuroscience, technical questions on telecommunications to arguments on philosophical, political, or spiritual subjects. It's a bit like a neighborhood pub or coffee shop. It's a little like a salon, where I can participate in a hundred ongoing conversations with people who don't care what I look like or sound like, but who do care how I think and communicate. There are seminars and word fights in different corners. And it's all a little like a groupmind, where questions are answered, support is given, inspiration is

provided, by people I may have never heard from before, and whom I may never meet face to face.

Because we cannot see one another, we are unable to form prejudices about others before we read what they have to say: Race, gender, age, national origin and physical appearance are not apparent unless a person wants to make such characteristics public. People who are thoughtful but who are not quick to formulate a reply often do better in CMC than face to face or over the telephone. People whose physical handicaps make it difficult to form new friendships find that virtual communities treat them as they always wanted to be treated -- as thinkers and transmitters of ideas and feeling beings, not carnal vessels with a certain appearance and way of walking and talking (or not walking and not talking). Don't mistake this filtration of appearances for dehumanization: Words on a screen are quite capable of moving one to laughter or tears, of evoking anger or compassion, of creating a community from a collection of strangers.

From my informal research into virtual communities around the world, I have found that enthusiastic members of virtual communities in Japan, England, and the US agree that "increasing the diversity of their circle of friends" was one of the most important advantages of computer conferencing. CMC is a way to meet people, whether or not you feel the need to affiliate with them on a community level, but the way you meet them has an interesting twist: In traditional kinds of communities, we are accustomed to meeting people, then getting to know them; in virtual communities, you can get to know people and then choose to meet them. In some cases, you can get to know people who you might never meet on the physical plane.

How does anybody find friends? In the traditional community, we search through our pool of neighbors and professional colleagues, of acquaintances and acquaintances of acquaintances, in order to find people who share our values and interests. We then exchange information about one another, disclose and discuss our mutual interests, and sometimes we become friends. In a virtual community we can go directly to the place where our favorite subjects are being discussed, then get acquainted with those who share our passions, or who use words in a way we find attractive. In this sense, the topic is the address: You can't simply pick up a phone and ask to be connected with someone who wants to talk about Islamic art or California wine, or someone with a three year old daughter or a 30 year old Hudson; you can, however, join a computer

conference on any of those topics, then open a public or private correspondence with the previously-unknown people you find in that conference. You will find that your chances of making friends are magnified by orders of magnitude over the old methods of finding a peer group.

You can be fooled about people in cyberspace, behind the cloak of words. But that can be said about telephones or face to face communications, as well; computer-mediated communications provide new ways to fool people, and the most obvious identity-swindles will die out only when enough people learn to use the medium critically. Sara Kiesler noted that the word "phony" is an artifact of the early years of the telephone, when media-naive people were conned by slick talkers in ways that wouldn't deceive an eight-year old with a cellular phone today.

There is both an intellectual and an emotional component to CMC. Since so many members of virtual communities are the kind of knowledge-based professionals whose professional standing can be enhanced by what they know, virtual communities can be practical, cold-blooded instruments. Virtual communities can help their members cope with information overload. The problem with the information age, especially for students and knowledge workers who spend their time immersed in the info-flow, is that there is too much information available and no effective filters for sifting the key data that are useful and interesting to us as individuals. Programmers are trying to design better and better "software agents" that can seek and sift, filter and find, and save us from the awful feeling one gets when it turns out that the specific knowledge one needs is buried in 15,000 pages of related information.

The first software agents are now becoming available (e.g., WAIS, Rosebud), but we already have far more sophisticated, if informal, social contracts among groups of people that allow us to act as software agents for one another. If, in my wanderings through information space, I come across items that don't interest me but which I know one of my worldwide loose-knit affinity group of online friends would appreciate, I send the appropriate friend a pointer, or simply forward the entire text (one of the new powers of CMC is the ability to publish and converse with the same medium). In some cases, I can put the information in exactly the right place for 10,000 people I don't know, but who are intensely interested in that specific topic, to find it when they need it. And sometimes, 10,000 people I don't know do the same thing for me.

This unwritten, unspoken social contract, a blend of strong-tie and weak-tie relationships among people who have a mixture of motives, requires one to give something, and enables one to receive something. I have to keep my friends in mind and send them pointers instead of throwing my informational discards into the virtual scrap-heap. It doesn't take a great deal of energy to do that, since I have to sift that information anyway in order to find the knowledge I seek for my own purposes; it takes two keystrokes to delete the information, three keystrokes to forward it to someone else. And with scores of other people who have an eye out for my interests while they explore sectors of the information space that I normally wouldn't frequent, I find that the help I receive far outweighs the energy I expend helping others: A marriage of altruism and self-interest.

The first time I learned about that particular cyberspace power was early in the history of the WELL, when I was invited to join a panel of experts who advise the U.S. Congress Office of Technology Assessment (OTA). The subject of the assessment was "Communication Systems for an Information Age." I'm not an expert in telecommunication technology or policy, but I do know where to find a group of such experts, and how to get them to tell me what they know. Before I went to Washington for my first panel meeting, I opened a conference in the WELL and invited assorted information-freaks, technophiles, and communication experts to help me come up with something to say. An amazing collection of minds flocked to that topic, and some of them created whole new communities when they collided.

By the time I sat down with the captains of industry, government advisers, and academic experts at the panel table, I had over 200 pages of expert advice from my own panel. I wouldn't have been able to integrate that much knowledge of my subject in an entire academic or industrial career, and it only took me (and my virtual community) a few minutes a day for six weeks. I have found the WELL to be an outright magical resource, professionally. An editor or producer or client can call and ask me if I know much about the Constitution, or fiber optics, or intellectual property. "Let me get back to you in twenty minutes," I say, reaching for the modem. In terms of the way I learned to use the WELL to get the right piece of information at the right time, I'd say that the hours I've spent putting information into the WELL turned out to be the most lucrative professional investments I've ever made.

The same strategy of nurturing and making use of loose information-sharing affiliations across the net can be applied to an infinite domain of problem areas, from literary criticism to software evaluation. It's a neat way for a sufficiently large, sufficiently diverse group of people to multiply their individual degree of expertise, and I think it could be done even if the people aren't involved in a community other than their company or their research specialty. I think it works better when the community's conceptual model of itself is more like barn-raising than horse-trading, though. Reciprocity is a key element of any market-based culture, but the arrangement I'm describing feels to me more like a kind of gift economy where people do things for one another out of a spirit of building something between them, rather than a spreadsheet-calculated quid pro quo. When that spirit exists, everybody gets a little extra something, a little sparkle, from their more practical transactions; different kinds of things become possible when this mindset pervades. Conversely, people who have valuable things to add to the mix tend to keep their heads down and their ideas to themselves when a mercenary or hostile zeitgeist dominates an online community.

I think one key difference between straightforward workaday reciprocity is that in the virtual community I know best, one valuable currency is knowledge, elegantly presented. Wit and use of language are rewarded in this medium, which is biased toward those who learn how to manipulate attention and emotion with the written word. Sometimes, you give one person more information than you would give another person in response to the same query, simply because you recognize one of them to be more generous or funny or to-the-point or agreeable to your political convictions than the other one.

If you give useful information freely, without demanding tightly-coupled reciprocity, your requests for information are met more swiftly, in greater detail, than they would have been otherwise. The person you help might never be in a position to help you, but someone else might be. That's why it is hard to distinguish idle talk from serious context-setting. In a virtual community, idle talk is context-setting. Idle talk is where people learn what kind of person you are, why you should be trusted or mistrusted, what interests you. An agora is more than the site of transactions; it is also a place where people meet and size up one another.

A market depends on the quality of knowledge held by the participants, the buyers and sellers, about price and availability and a thousand other things that

influence business; a market that has a forum for informal and back-channel communications is a better-informed market. The London Stock Exchange grew out of the informal transactions in a coffee-house; when it became the London International Stock Exchange a few years ago, and abolished the trading-room floor, the enterprise lost something vital in the transition from an old room where all the old boys met and cut their deals to the screens of thousands of workstations scattered around the world.

The context of the informal community of knowledge sharers grew to include years of both professional and personal relationships. It is not news that the right network of people can serve as an inquiry research system: You throw out the question, and somebody on the net knows the answer. You can make a game out of it, where you gain symbolic prestige among your virtual peers by knowing the answer. And you can make a game out of it among a group of people who have dropped out of their orthodox professional lives, where some of them sell these information services for exorbitant rates, in order to participate voluntarily in the virtual community game.

When the WELL was young and growing more slowly than it is now, such knowledge-potlatching had a kind of naively enthusiastic energy. When you extend the conversation -- several dozen different characters, well-known to one another from four or five years of virtual hanging-out, several hours a day -- it gets richer, but not necessarily "happier."

Virtual communities have several drawbacks in comparison to face-to-face communication, disadvantages that must be kept in mind if you are to make use of the power of these computer-mediated discussion groups. The filtration factor that prevents one from knowing the race or age of another participant also prevents people from communicating the facial expressions, body language, and tone of voice that constitute the inaudible but vital component of most face to face communications. Irony, sarcasm, compassion, and other subtle but all-important nuances that aren't conveyed in words alone are lost when all you can see of a person are words on a screen.

It's amazing how the ambiguity of words in the absence of body language inevitably leads to online misunderstandings. And since the physical absence of other people also seems to loosen some of the social bonds that prevent people from insulting one another in person, misunderstandings can grow into truly nasty stuff before anybody has a chance to untangle the original miscommunication. Heated diatribes and interpersonal incivility that wouldn't

crop up often in face to face or even telephone discourse seem to appear with relative frequency in computer conferences. The only presently available antidote to this flaw of CMC as a human communication medium is widespread knowledge of this flaw -- aka "netiquette."

Online civility and how to deal with breaches of it is a topic unto itself, and has been much-argued on the WELL. Degrees of outright incivility constitute entire universes such as alt.flame, the Usenet newsgroup where people go specifically to spend their days hurling vile imprecations at one another. I am beginning to suspect that the most powerful and effective defense an online community has in the face of those who are bent on disruption might be norms and agreements about withdrawing attention from those who can't abide by even loose rules of verbal behavior. "If you continue doing that," I remember someone saying to a particularly persistent would-be disrupter, "we will stop paying attention to you." This is technically easy to do on Usenet, where putting the name of a person or topic header in a "kill file" (aka "bozo filter") means you will never see future contributions from that person or about that topic. You can simply choose to not see any postings from Rich Rosen, or that feature the word "abortion" in the title. A society in which people can remove one another, or even entire topics of discussion, from visibility. The WELL does not have a bozo filter, although the need for one is a topic of frequent discussion.

Who Is The WELL?

One way to know what the WELL is like is to know something about the kind of people who use it. It has roots in the San Francisco Bay Area, and in two separate cultural revolutions that took place there in past decades. The Whole Earth Catalog originally emerged from the counterculture as Stewart Brand's way of providing access to tools and ideas to all the communes who were exploring alternate ways of life in the forests of Mendocino or the high deserts outside Santa Fe. The Whole Earth Catalogs and the magazines they spawned, *Co-Evolution Quarterly* and *Whole Earth Review*, have outlived the counterculture itself, since they are still alive and raising hell after nearly 25 years. For many years, the people who have been exploring alternatives and are open to ideas that you don't find in the mass media have found themselves in cities instead of rural communes, where their need for new tools and ideas didn't go away.

The Whole Earth Catalog crew received a large advance in the mid-1980s to produce an updated version, a project involving many geographically-separated authors and editors, many of whom were using computers. They bought a minicomputer and the license to Picospan, a computer conferencing program, leased an office next to the magazine's office, leased incoming telephone lines, set up modems, and the WELL was born in 1985. The idea from the beginning was that the founders weren't sure what the WELL would become, but they would provide tools for people to build it into something useful. It was consciously a cultural experiment, and the business was designed to succeed or fail on the basis of the results of the experiment. The person Stewart Brand chose to be the WELL's first director -- technician, manager, innkeeper, and bouncer -- was Matthew McClure, not-coincidentally a computer-savvy veteran of The Farm, one of the most successful of the communes that started in the sixties. Brand and McClure started a low-rules, high-tone discussion, where savvy networkers, futurists, misfits who had learned how to make our outsiderness work for us, could take the technology of CMC to its cultural limits.

The Whole Earth network -- the granola-eating utopians, the solar-power enthusiasts, serious ecologists and the space-station crowd, immortalists, Biospherians, environmentalists, social activists -- was part of the core population from the beginning. But there were a couple of other key elements. One was the subculture that happened ten years after the counterculture era -- the personal computer revolution. Personal computers and the PC industry were created by young iconoclasts who wanted to have whizzy tools and change the world. Whole Earth had honored them, including the outlaws among them, with the early Hacker's Conferences. The young computer wizards, and the grizzled old hands who were still messing with mainframes, showed up early at the WELL because the guts of the system itself -- the UNIX operating system and "C" language programming code -- were available for tinkering by responsible craftsmen.

A third cultural element that made up the initial mix of the WELL, which has drifted from its counterculture origins in many ways, were the deadheads. Books and theses have been written about the subculture that have grown up around the band, the Grateful Dead. The deadheads have a strong feeling of community, but they can only manifest it en masse when the band has concerts. They were a community looking for a place to happen when several

technology-savvy deadheads started a "Grateful Dead Conference" on the WELL. GD was so phenomenally successful that for the first several years, deadheads were by far the single largest source of income for the enterprise.

Along with the other elements came the first marathon swimmers in the new currents of the information streams, the futurists and writers and journalists. The New York Times, Business Week, the San Francisco Chronicle, Time, Rolling Stone, Byte, the Wall Street Journal all have journalists that I know personally who drop into the WELL as a listening post. People in Silicon Valley lurk to hear loose talk among the pros. Journalists tend to attract other journalists, and the purpose of journalists is to attract everybody else: most people have to use an old medium to hear news about the arrival of a new medium.

Things changed, both rapidly and slowly, in the WELL. There were about 600 members of the WELL when I joined, in the summer of 1985. It seemed that then, as now, the usual ten percent of the members did 80% of the talking. Now there are about 6000 people, with a net gain of about a hundred a month. There do seem to be more women than other parts of cyberspace. Most of the people I meet seem to be white or Asian; African-Americans aren't missing, but they aren't conspicuous or even visible. If you can fake it, gender and age are invisible, too. I'd guess the WELL consists of about 80% men, 20% women. I don't know whether formal demographics would be the kind of thing that most WELL users would want to contribute to. It's certainly something we'd discuss, argue, debate, and joke about.

One important social rule was built into Picospan, the software that the WELL lives inside: Nobody is anonymous. Everybody is required to attach their real "userid" to their postings. It is possible to use pseudonyms to create alternate identities, or to carry metamessages, but the pseudonyms are always linked in every posting to the real userid. So individual personae -- whether or not they correspond closely to the real person who owns the account -- are responsible for the words they post. In fact, the first several years, the screen that you saw when you reached the WELL said "You own your own words." Stewart Brand, the WELL's co-founder likes epigrams: "Whole Earth," "Information wants to be free." "You own your own words." Like the best epigrams, "You own your own words" is open to multiple interpretations. The matter of responsibility and ownership of words is one of the topics WELL

beings argue about endlessly, so much that the phrase has been abbreviated to "YOYOW," As in, "Oh no, another YOYOW debate."

Who are the WELL members, and what do they talk about? I can tell you about the individuals I have come to know over six years, but the WELL has long since been something larger than the sum of everybody's friends. The characteristics of the pool of people who tune into this electronic listening post, whether or not they every post a word in public, is a strong determinant of the flavor of the "place." There's a cross-sectional feeling of "who are we?" that transcends the intersecting and non-intersecting rings of friends and acquaintances each individual develops.

My Neighborhood On The WELL

Every CMC system gives users tools for creating their own sense of place, by customizing the way they navigate through the database of conferences, topics, and responses. A conference or newsgroup is like a place you go. If you go to several different places in a fixed order, it seems to reinforce the feeling of place by creating a customized neighborhood that is also shared by others. You see some of the same users in different parts of the same neighborhood. Some faces, you see only in one context -- the parents conference, the Grateful Dead tours conference, the politics or sex conference.

My home neighborhood on the WELL is reflected in my ".cflist," the file that records my preferences about the order of conferences I visit. It is always possible to go to any conference with a command, but with a `.cflist' you structure your online time by going from conference to specified conference at regular intervals, reading and perhaps responding in several ongoing threads in several different places. That's the part of the art of discourse where I have found that the computer adds value to the intellectual activity of discussing formally distinct subjects asynchronously, from different parts of the world, over extending periods, by enabling groups to structure conversations by topic, over time.

My `.cflist' starts, for sentimental reasons, with the **Mind** conference, the first one I hosted on the WELL, since 1985. I've changed my `.cflist' hundreds of times over the years, to add or delete conferences from my regular neighborhood, but I've always kept Mind in the lead. The entry banner screen for the Mind conference used to display to each user the exact phase of the moon in numbers and ASCII graphics every time they logged in to the

conference. But the volunteer programmer who had created the "phoon" program had decided to withdraw it, years later, in a dispute with WELL management. There is often a technological fix to a social problem within this particular universe. Because the WELL seems to be an intersection of many different cultures, there have been many experiments with software tools to ameliorate problems that seemed to crop up between people, whether because of the nature of the medium or the nature of the people. A frighteningly expensive pool of talent was donated by volunteer programmers to create tools and even weapons for WELL users to deal with each other. People keep giving things to the WELL, and taking them away. Offline readers and online tools by volunteer programmers gave others increased power to communicate.

The **News** conference is what's next. This is the commons, the place where the most people visit the most often, where the most outrageous off-topic proliferation is least pernicious, where the important announcements about the system or social events or major disputes or new conferences are announced. When an earthquake or fire happens, News is where you want to go. Immediately after the 1989 earthquake and during the Oakland fire of 1991, the WELL was a place to check the damage to the local geographic community, lend help to those who need it, and get first-hand reports. During Tiananmen square, the Gulf War, the Soviet Coup, the WELL was a media-funnel, with snippets of email from Tel-Aviv and entire newsgroups fed by fax machines in China, erupting in News conference topics that grew into fast-moving conferences of their own. During any major crisis in the real world, the routine at our house is to turn on CNN and log into the WELL.

After News is **Hosts**, where the hottest stuff usually happens. The hosts community is a story in itself. The success of the WELL in its first five years, all would agree, rested heavily on the efforts of the conference hosts -- online characters who had created the character of the first neighborhoods and kept the juice flowing between one another all over the WELL, but most pointedly in the Hosts conference. Some spicy reading in the Archives conference originated from old hosts' disputes - and substantial arguments about the implications of CMC for civil rights, intellectual property, censorship, by a lot of people who know what they are talking about, mixed liberally with a lot of other people who don't know what they are talking about, but love to talk anyway, via keyboard and screen, for years on end.

In this virtual place, the pillars of the community and the worst offenders of public sensibilities are in the same group -- the hosts. At their best and their worst, this ten percent of the online population put out the words that the other ninety percent keep paying to read. Like good hosts at any social gathering, they make newcomers welcome, keep the conversation flowing, mediate disputes, clean up messes, and throw out miscreants, if need be. A WELL host is part salon keeper, part saloon keeper, part talk-show host, part publisher. The only power to censor or to ban a user is the hosts' power. Policy varies from host to host, and that's the only policy. The only justice for those who misuse that power is the forced participation in weeks of debilitating and vituperative post-mortem.

The hosts community is part long-running soap opera, part town meeting, bar-room brawl, anarchic debating society, creative groupmind, bloody arena, union hall, playpen, encounter group. The Hosts conference is extremely general, from technical questions to personal attacks. The Policy conference is supposed to be restricted to matters of what WELL policy is, or ought to be.

The part-delusion, part-accurate perception that the hosts and other users have strong influence over WELL policy is part of what feeds debate here, and a strong element in the libertarian reputation of the stereotypical WELLite. After fighting my way through a day's or hour's worth of the Hot New Dispute in News, Hosts, and Policy, I check on the conferences I host -- Info, Virtual Communities, Virtual Reality. After that my `.cflist' directs me, at the press of the return key, to the first new topic or response in the Parenting, Writers', Grateful Dead tours, Telecommunication, Macintosh, Weird, Electronic Frontier Foundation, Whole Earth, Books, Media, Men on the WELL, Miscellaneous, and Unclear conferences.

The social dynamics of the WELL spawn new conferences in response to different kinds of pressures. Whenever a hot interpersonal or doctrinal issue breaks out, for example, people want to stage the brawl or make a dramatic farewell speech or shocking disclosure or serious accusation in the most heavily-visited area of the WELL, which is usually the place that others want to be a Commons -- a place where people from different sub-communities can come to find out what is going on around the WELL, outside the WELL, where they can pose questions to the committee of the whole. When too many discussions of what the WELL's official policy ought to be, about censorship or intellectual property or the way people treat each other, break out, they tended

to clutter the place people went to get a quick sense of what is happening outside their neighborhoods. So the Policy conference was born.

But then the WELL grew larger and it wasn't just policy but governance and social issues like political correctness or the right of users to determine the social rules of the system. Several years and six thousand more users after the fission of the News and Policy conferences, another conference split off News -- "MetaWELL," a conference was created strictly to discussions about the WELL itself, its nature, its situation (often dire), its future.

Grabbing attention in the Commons is a powerful act. Some people seem drawn to performing there; others burst out there in acts of desperation, after one history of frustration or another. Dealing with people who are so consistently off-topic or apparently deeply grooved into incoherence, long-windedness, scatology, is one of the events that challenges a community to decide what its values really are, or ought to be.

Something is happening here. I'm not sure anybody understands it yet. I know that the WELL and the net is an important part of my life and I have to decide for myself whether this is a new way to make genuine commitments to other human beings, or a silicon-induced illusion of community. I urge others to help pursue that question in a variety of ways, while we have the time. The political dimensions of CMC might lead to situations that would pre-empt questions of other social effects; responses to the need for understanding the power-relationships inherent in CMC are well represented by the Electronic Frontier Foundation and others. We need to learn a lot more, very quickly, about what kind of place our minds are homesteading.

The future of virtual communities is connected to the future of everything else, starting with the most precious thing people have to gain or lose -- political freedom. The part played by communication technologies in the disintegration of communism, the way broadcast television pre-empted the American electoral process, the power of fax and CMC networks during times of political repression like Tiananmen Square and the Soviet Coup attempt, the power of citizen electronic journalism, the power-maneuvering of law enforcement and intelligence agencies to restrict rights of citizen access and expression in cyberspace, all point to the future of CMC as a close correlate of future political scenarios. More important than civilizing cyberspace is ensuring its freedom as a citizen-to-citizen communication and publication medium; laws that infringe equity of access to and freedom of expression in cyberspace

could transform today's populist empowerment into yet another instrument of manipulation. Will "electronic democracy" be an accurate description of political empowerment that grows out of the screen of a computer? Or will it become a brilliant piece of disinfotainment, another means of manipulating emotions and manufacturing public opinion in the service of power.

Who controls what kinds of information is communicated in the international networks where virtual communities live? Who censors, and what is censored? Who safeguards the privacy of individuals in the face of technologies that make it possible to amass and retrieve detailed personal information about every member of a large population? The answers to these political questions might make moot any more abstract questions about cultures in cyberspace. Democracy itself depends on the relatively free flow of communications. The following words by James Madison are carved in marble at the United States Library of Congress: "A popular government without popular information, or the means of acquiring it, is but a prologue to a farce or a tragedy, or perhaps both. Knowledge will forever govern ignorance, and a people who mean to be their own governors must arm themselves with the power which knowledge gives." It is time for people to arm themselves with power about the future of CMC technology.

Who controls the market for relationships? Will the world's increasingly interlinked, increasingly powerful, decreasingly costly communications infrastructure be controlled by a small number of very large companies? Will cyberspace be privatized and parceled out to those who can afford to buy into the auction? If political forces do not seize the high ground and end today's freewheeling exchange of ideas, it is still possible for a more benevolent form of economic control to stunt the evolution of virtual communities, if a small number of companies gain the power to put up toll-roads in the information networks, and smaller companies are not able to compete with them.

Or will there be an open market, in which newcomers like Apple or Microsoft can become industry leaders? The playing field in the global telecommunications industry will never be level, but the degree of individual freedom available through telecommunication technologies in the future may depend upon whether the market for goods and services in cyberspace remains open for new companies to create new uses for CMC.

I present these observations as a set of questions, not as answers. I believe that we need to try to understand the nature of CMC, cyberspace, and virtual

communities in every important context -- politically, economically, socially, culturally, and cognitively. Each different perspective reveals something that the other perspectives do not reveal. Each different discipline fails to see something that another discipline sees very well. We need to think as teams here, across boundaries of academic discipline, industrial affiliation, nation, to understand, and thus perhaps regain control of, the way human communities are being transformed by communication technologies. We can't do this solely as dispassionate observers, although there is certainly a huge need for the detached assessment of social science. But community is a matter of the heart and the gut as well as the head. Some of the most important learning will always have to be done by jumping into one corner or another of cyberspace, living there, and getting up to your elbows in the problems that virtual communities face.

Howard Rheingold (1985) *Tools for Thought* New York, NY.

Howard Reingold (1991) *Virtual Reality* New York, NY: Simon & Schuster.

Howard Rheingold (1993) *The Virtual Community* Wesley, Reading, MA.

"Everybody's got somewhere they call home." **--- Roger Waters**

"All's WELL that ends WELL." **--- Shakespeare**

Shared imagination

Dr. Douglas C. Engelbart[1]

When I agreed to be a judge for the National Infocomm Awards in Singapore, quite honestly I didn't know what I was letting myself in for. When the boxes of paper started arriving in multiple DHL packages in California, describing a lot of different interesting, innovative projects, I thought, "Oh Oh, how ever am I going to be able to evaluate these people? How can I do the job I want to as a judge when I have no idea how innovative these products are in the US? Much less in Asia?"

Well, I was assured "Just do your best!" When someone tells me that, I know exactly what to do: I always do my best when I augment what I know and what I can do with the knowledge and expertise of others. I recruited one of the best guys I knew for being networked amongst the top people in the US technology community, Eugene Miya. He works at NASA Ames research center, NASA's top IT facility. He also happens to be NASA's technical reviewer on major innovation research projects, like the Digital Library initiative. NASA, NSF and DARPA - the US federal agencies for R&D in space, science and defense, pooled their funding for their WWW related projects into one big umbrella they called the Digital Library initiative. So Eugene knows everyone who knows things at the cutting edge of product/services, particularly those related to the Internet.

With Eugene in place, the rest was easy. He knew who could help with what. The Chief Scientist at the FBI helped us evaluate the Supreme Court application e-Litigation and the Singapore Police Force project: AVSS - Automated Vehicle Screening System. We got a little extra help on AVSS from Professor Hsinchun Chen at the University of Arizona. He's developed one of the latest innovations in US law enforcement, an application called CopLink.

[1] Speech at a gala for recipients of Singapore's National Infocomm awards,, 23 April 2002.

For Fairex, Gridnode and Systems@Work, I called on an old buddy of mine, used to work with me at SRI back in the 60's and 70's, Dan Lynch - he was one of the founders of CyberCash and pretty active in Interop.

Eugene with his knowledge of the NASA and Digital Library worlds filled in for the rest, Fuji Photo, Infotalk, Muve technologies, Nanyang Polytechnic.

So it was a fun project I'm glad to have been involved in. It's also a good demonstration of what I have always felt is a critical component of innovation: I solved my problem by working with others to tap their expertise.

In a way, my thoughts on innovation reflect this basic feeling of mine: that to solve problems, we need better ways to work with others. Many of the inventions for which I get the credit, were developed in the team at SRI called the Augmentation Lab - they were developed to provide technology that augmented people's ability to collaboratively work together to solve problems.

I have been asked, in the short talk to you tonight, to speak to the challenges and opportunities that face Singapore as it moves forward to become a central place for knowledge work. The really important thing about knowledge, of course, is not just having it, but comes in using it to do something that you couldn't do before - to innovate. The challenge - and this is true for any person, company, or country engaged in innovation - the challenge is to move beyond walking step after step down paths that are well understood and, instead, doing something new. This shouldn't just be good luck. The really important question is how can an entire society organize itself to facilitate innovation?

One piece of the answer is how I solved the problem of being a judge confronted with ten very different innovations in vastly different fields - I harnessed the Collective IQ of my network of friends and associates.

The other piece of the answer relates to taking a very different view of how technology can, in fact, multiply enormously the value of Collective IQ.

I have had this long-term, consistent goal about how we can use interactive computers to do collective work. Long experience talking to people about this, made me realize that there is a huge amount of resistance to this type of very large change. This led me to work on that problem - how to help people harness the great deal of gain that I could see, could come from using the power of computers to augment our ability to collaborate. How do we use computers not

just to help us do the jobs that face us today - but to actually boost our Collective IQ?

This made me think about how inventions affect humans and how humans are changed. For example, when automobiles were first invented, we had no rules for cooperating together to avoid collisions or govern traffic flow. We developed those over time. And we certainly did not have the capability to use, say, the rear view mirror of a car to handle decisions at 100 kilometers per hour. But now we think nothing of that. We do these very complex things, but take them for granted. And, at the same time, in adapting to such activity, we have changed a very great deal about how we interact, about how we organize our cities, about how we live and who we are.

If all of this happens with something as simple as an automobile, imagine what is possible with a computer, if we can interact with it fully.

The experience I had with the radar as a technician during World War II gave me the idea about what computer screens could be capable of. I turned these ideas over and over and over again, and worked in positions where I would try to get grants to work on this stuff. It was the fourth year of trying and getting rejected that I finally got my first small grant to do a piece of what I could see was possible.

I suppose that maybe my persistence, in spite of rejection, and the eventual breakthroughs are due to the fact that I was too dumb to know when it was time to give up. I have never given up. The reason is that it is so clear to me what computers could do to help mankind. So, I kept trying to make it real.

Making big innovations is hard and lonely work. It continues today to be difficult to communicate the many great possibilities that are available by people working together supported in new, significantly different ways by computers. At the same time, I am very much encouraged by the conversations that I have had with people here in Singapore this week. I have the feeling that there is increased understanding that innovation is a job for a whole society, and not just something that an individual does, working alone.

As a closing thought, I should tell you that I was asked today whether we can train people to be more innovative.

I'm no expert at all, I can only say what made a difference for me. I am a great believer in how much our behavior stems from our memories and from

the experience that we share with others. Where in the world do the big innovative ideas come from? From the shared human imagination. We need to train people to unlock and share their imagination.

We're all swimming in media: End-users must be able to keep secrets

Mitch Ratcliffe[1]

William Gibson, "Father of Cyberpunk," long known for his prescience, has put his finger on a fundamental truth about the world we live in today. His new book, *Spook Country*, contains a couple passages everyone concerned with media business models and the preservation of democracy should read and consider (along with the rest of the book, which is a pretty good yarn about the hidden currents of American paranoia).

When developing media offerings these days, we developers still think of an "audience." These are people whose attention we own and attempt to control. At least, that was the habitual practice of newspaper, magazine and broadcast television network folks.

Gibson's first observation, that we have moved from a time when mass media was something we observed to one when we are all part of mass media, that it has become the channels through which we interact with one another, is a spot-on analysis of the problem with trying to treat the "audience" as something outside the medium.

Because the old way of thinking about media persists, we have social networks that treat member data as commodity (a commodity is only valuable if it is managed by a company or trader, rather than having an inherent value—just ask any farmer who has seen his crop values manipulated by the middlemen). These sites ask members to publish their commodity identities in

[1] Mitch Ratcliffe (www.ratcliffe.com) has covered technology, freedom and privacy issues for 20 years. He is cofounder of BuzzLogic Inc., a social influence analytics company, and, most recently, of Tetriad LLC, which is developing a social relationship system that preserves user control of information.

order to receive value in return, a condition that reduces one's personal control of social exposure and interaction. We get "programs" that *speak at us* rather than media we participate in, because individual value is minuscule when the audience is merely being aggregated by a Web site or network.

During the fall of 2007, a flurry of blog postings about a bill of rights for social network users represented an expression of the frustration felt by people who understand that they dove into media years ago, but still are treated like they are merely watching from the edge of the pool by those who make "media properties."

Initially proposed by Joseph Smarr, Marc Canter, Robert Scoble and Michael Arrington, the putative bill of rights calls for users of social networking to retain:

- Ownership of their own personal information, including:
    - their own profile data,
    - the list of people they are connected to,
      the activity stream of content they create;
- Control of whether and how such personal information is shared with others; and
- Freedom to grant persistent access to their personal information to trusted external sites.

Considered against that call for greater control of personally identifiable information, the user agreements that memorialize the binary all-your-data-or-nothing approach to personal information on major social networks, seem like the kind of warnings posted at a public pool and that we need a lifeguard to caution us about eating before swimming.

We know how to swim. The "new" media that surrounds us is made by us. We can point a camera at anything, record anything, write and publish. In this world, anything can become a trend or media phenomenon, even if most of it won't be a hit. Recognizing that the value is flowing everywhere, rather than only from the studios, producers and web site creators, unlocks the respect for the value of all participants in the network that bill of rights supporters are seeking.

Competent participants in a community or network don't need a warning that they are about to give away every bit of information they have collected in social network profile in order to try a new application or find a new friend.

They need control in order to maximize the value of their contribution. That's an ethically, politically and economically responsible perspective on this new media.

Gibson's other insight explains how, once you get past treating people like lost children in the media stream, revenue and power is unlocked:

"Intelligence, Hollis, is advertising turned inside out."

"Which means?" [Hollis asked].

"Secrets," said Bigend, gesturing toward the screen, "are cool…. Secrets are the very root of cool."

When one recognizes that all of us have secrets we use to negotiate with others, the value of giving users control of personal data becomes plain: If they can't keep secrets, people don't contribute to value creation. Instead, they are always scrambling to recoup the value they've lost.

Working openly

Lion Kimbro[1]

The World That Is Possible

This paper explains very simple, cheap, low-risk things, that each of us can do, to bring us closer to this world.[2] I ask each and every reader of this paper, save those with very specific circumstances, to do these things.

I write this during the first half of November, 2007.

In the world that is possible, I get an e-mail from a near-by activist, who is working on growing a local pot-luck culture, amongst activists. She's arranging a vegetarian cooking night, and trawling the local area for people who are activists, political bloggers, geeks, transportation people, and inviting them over for a dinner, to be held once every three months. We will step out our doors, walk down a street, knock on her door, and she'll let us in, and we'll talk over dinner. There will be 20–30 of us. Not only is that happening here in Bothell, but it is happening all over the globe.

And it's not happening because there's a major organization propagating this idea—it's just happening because, well, she can see that we're out here quite plainly on her computer, and, she's always wanted to know who her neighbors are. She likes conversations that have social significance. She's just a caring person.

In the world that is possible, and already very close to reality, I have arranged a local Bothell "*lets-get-together, programmers, system*

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[2] A variety of movement leaders, such as David Korten, Anodea Judith, Joanna Macy, Michael Dowd, and Paul Hawken are all, each in their own way, articulating the vision of a global movement, one leading to a world where the power of love overcomes the love of power, and the world knows peace.

administrators, IEEE/ISOC/W3C participants, hardware hackers" gathering. I look around on the web, and take down the e-mail addresses of the programmers, sys admins, IEEE/ISOC/W3C people, hardware hackers, and what not, and compose a list of 100 e-mail addresses. That's too many to start with, so I make the list ten people (who live closest to me, say), and invite them to come to dinner. Three of them have the time on the particular date I chose, and I say, "Well, there are 100 of us, where can we find a place and a date? It sure would be a shame for us not to meet." One isn't interested, the other two are, and we work at figuring out how to do it. Half a year later, and we have an invite going out to 100, to meet at the walkably near fraternity hall. Twenty people come, the conversation is lively, and we vow to do it again, and to bring our friends and family next time.

The world that is possible is a world of community, both local and global. The world that is possible is a world of ideas, where people like to talk, and the world that is possible is a world of action, where people do things together. The world that is possible is a world of plenty, because when you have a genuine community, there's always somebody you can trust to watch your kid out of the honor of doing it, rather than requiring pay, there's always plenty of work on the grapevine, and there's always someone who has a digital camera, computer, scanner, or whatever tool is needed, to make something, or meet a particular need. There's always somebody who knows somebody. Communities are strong, and resilient, and strong, and loving.

In the world that is possible, half the people are loving life and having a party, and the other half are waking up from the cultural trance of advertising and consumerism. Perhaps in 2014, they'll notice that there are 3x more trick-or-treaters at the door, than there were before. Or perhaps they'll see that the community bulletin board is a lot more active lately. Or perhaps the local community will be galvanized, and someone will knock on the person's door, to invite them to a local potluck dinner.

This is part of the world that is possible: an inclusive, loving, and secure place, where people know, love, and watch out for one another.

Simple Things You Can Do

All we have to do, is live, work, and play openly.

- Use your real name online.
- Keep your mailing lists public and visible.
- Put your latitude & longitude on your website.
- Make your social networking data public.
- Don't use Basecamp or any other tools that conceal your work.
- Keep a blog and make it public.
- ... (and so on)

Offline techniques:

- Take a leaf from the Mormons: Talk with your neighbors.
- Write a leaflet about who you are, what you're about; Share it!
- Share papers about what you're working on, and post them in your neighborhood bulletin boards.

This is all very simple.

I estimate that perhaps three in twenty of the readership of this book, at the time of this reading, is doing these things. John Abbe, you're okay–you're doing right.

In a little more detail:

Email: most of us are in continuing conversations with other activists, thinkers, and so on. Make these conversations into formal mailing lists, (it should take about 5–10 minutes with Google Groups, or other mailing list packages,) and set them to "public read, public subscribe." *Public archives mandatory!* You can put moderations on the subscription, to lock out spammers.

Lat & Long: There are detailed instructions at: http://geourl.org/add.html . GeoURL does not "lock you in," the website you put the coordinates on is your own, and any computer can make use of them.

Social Networking: Social networking sites *love* it when you keep your data private. That means more money for them, since people have to join the social networking site to see you. **Do not** join any such social networking site. Look for sites that give you maximum visibility and connectivity with others.

Basecamp: There are many tools that hide your data for you, I'm just picking on Basecamp because it's particularly popular. Stay away from them. Use a publicly visible wiki, instead. I recommend Oddmuse. Some data really must be kept private, such as e-mail lists. Exchange those in private email, or some other private data store. Only use the private channels for things that really *must* be private. Avoid talking about truly private things, where someone else is in jeopardy. (Do so when you must, though.)

Blog: If you have a professional blog and a personal blog, make them both public.

"What?! That's Crazy Talk!"

It's very simple: We say, "I am not afraid," and we "come out." It's actually not dangerous at all. It's also not a productivity sink; People imagine being pestered by Paparazi all the time. It's not like that at all.

Our faith in and belief in privacy is vastly overrated.

For those who fear the government: If the government wants to tap you, it will. In some respects, we're already *in* 1984. The problem of 1984 isn't that people are being seen, the problem is that people are seen ONLY by the government. In 1984, the totalitarian government does everything in its power to *prevent* people from seeing each other. If I were an ominous power, my goal would be to keep people isolated, in their homes, not talking with each other, and unaware of each other's activities. "Stay home, stay quiet, don't speak out, don't talk with others." I would say, "Activists are bad people who mess with our perfect harmony," and I would try to make activists as invisible as possible. The doctrine of privacy is very useful in this respect. (This is not, however, intended to denigrate the work of privacy activists: There is a definite need for privacy, and privacy is definitely under attack; Privacy should be possible. We just rely on it way too much.)

For those who fear technology: Contemplate the virtue of communication.

For those who fear being pestered: Philip Greenspun is rather famous in the web world, he wrote a number of excellent books, published them online, and made a number of people rich. His cell phone number, home phone number, and street address is all publicly visible from his contact info. He's written that he has ONCE received a phone call that was unwanted. I have personally tested this. I'm not nearly as famous as Philip Greenspun, but I have all my public information out there. I have received a great bounty because of this—people who I'd lost contact with, a job offer that I accepted and became a powerful job for me, people with good ideas who became my friends, contacts in media who wrote on some aspect of my work or another. To date, I have not received a SINGLE prank call, or other unwanted attention. Not a single one.

For those who don't have time: Hold the intention in mind. As your train is going down the tracks, and you encounter switching points, choose the ones that lead to greater visibility and public exposure.

For those who live offline: Make a project of making a web page for yourself, telling a little about yourself, and what you care about, and how to contact you. Investigate offline methods of sharing your life, your cares, and so on. And just… …wait! Computers are moving off the desk, into the laps, and then from there, to be simply embedded in our environment. The Internet world is transitioning from being a fairy world inside computers on desks, to becoming part and parcel of the material world.

For those who believe serious work can't work this way: The Internet Engineering Task Force (IETF) working groups ALL have public lists, that anybody can join. Their work is very serious, and has included: Defining e-mail, defining how it is sent and received. Defining HTTP, FTP, SSH, telnet, and myriad other protocols. Have you heard of Linux? Linus Torvalds, lead developer of Linux, works on the Linux Kernel developers mailing list, which can also be joined by anyone in the world, including you. Serious work has been done for decades in an open and public manner. For your doubts, just look at how they do it—it will be very instructive. (hint: "Working Openly" does *not* mean "Global invite to be interrupted by everyone." It just means that you're visible and accessible. There's an enormous difference between the two.)

For those who can't see how they'll make money: OK—you can sell your book, if you must, and not put them online. I can't convince you otherwise. But all the conversations with people that led *up* to the book existing, all the major development work, there's no reason that should be

private. They won't cut into your book sales, because the book is made for people who would rather get a *quick* introduction to your ideas, rather than tracing through myriad e-mail exchanges.

For those whose organizations prohibit it: Push for the freedom you need at work. In the meantime—sounds like you're screwed! Somewhere along the line, a bad deal was made. See what you can do.

For those who fear attracting weirdos: If your work attracts "weirdos," you have some community and message shaping to do. Work openly, but make it clear that you're busy, and are only to be interrupted for specific reasons, and only to be interrupted if something is relevant. Make the expectations for the space clear. If someone trespasses, ignore them, or make it clear that you don't want them there. The vast majority of the time, this works. Should it not work, (and I've never seen it not work,) there are restraining orders and other legal means of saying, "Go away." Is it worth the hassle? Absolutely: If you attract people, the vast majority of them will be good, courteous, genuine, and very very helpful. Not just helpful, "crucial." People will land at your doorstep to tell you ideas or give you opportunities that you hadn't even considered, but will fit perfectly. This is the gift and the bounty of working openly.

For those who fear embarrassing themselves: This is the 21st century. The Internet is old hat. If someone gets into an argument online, or something, it's just that: Someone got into an argument online. Or, when they were 20, they got drunk, got naked, and someone posted naked pics. Whoop-dee, who cares. I have plenty embarrassing things online, but it's never once come into the slightest consideration at work. Don't let your fear control you. Our fears are far greater than the reality. Community is about imperfect people, and imperfect image. Accept that, embrace it, be forgiving of others, and share your life with the world. This is Earth Community, this is Global Community. It's OK: We have big hearts.

For those who can't be found: First, society needs a new answer to stalkers. But until it finds one, you'll have to use code-names and private channels. When the safe communities develop around you, and you are secure in your livelihood and neighborhood, and your stalker is safe (and restrained) in his, then you can come out. In the meantime: code-names and private channels. Communities can and should be dual-channel—one for genuine secrets (padlock codes, people in hiding,) the other for general communication.

To everyone who is interested in the "theory" of these ideas, I recommend a book called *The Transparent Society*, by David Brin. I don't personally know David Brin, but I'd guess at least half of the geeks out there who think about stuff know his name, and this book.

Open Invitation To Earth Community

Tom Atlee, George Pór, and everyone else reading this book:

Please consider this to be *your invitation* (joy!) to join the Global Earth Community. That's just a name, but I'm just referring to "The Big World Out There." You don't have to register anywhere. Just make your communications effortlessly visible. Make your contact info visible. Put clear messages about what is and is not acceptable next to your number, should any problems arise.

Then: trust.

Or, tell me that I'm wrong, and why. And then tell the Open Source communities, and Wikipedia, and the IETF, because they really need to know too—they must be doing something very wrong.

Don't just *talk* about a world of global community, don't just *ask* for others to open up, and meet one another—let's all actually *do it*. Let's not admire the methods of the Free Software community from afar—let's just actually *do it*.

Spread the word about working publicly. It is time for us to stop living in fear of imaginary ghosts. It is time for us to start living Earth Community.

Kudos

Kudos to Tom Atlee, who identified the first round of contributors, to Robert Steele, who offered to fund the publication of the book, and to Mark Tovey who has been working semi-openly in the production of this book (the book has been visible in progress on the website), all also working openly on Wikipedia.

Kudos to *The Transitioner*, which also works openly on its wiki. Kudos to all those who primarily work in public forums.

Thanks to the CommunityWiki and Saturday House and Mencius Sodas, for helping me develop my ideas, and thanks to Sam Rose in particular.

The rest of you have some work to do. ;)

Remember The Vision: The Great "Coming Out"

1. People start to share themselves with the world.
2. Communities start to form, both local and global.
3. People start to value the life of their communities, rather than the status in the consumer trance. Talking with friends about passions overtakes TV culture.
4. Earth Community.

As sustainability concerns become more apparent to people, they have rich personal networks to help them make the necessary transitions.

People become wiser, because they understand how to live with others, and see the patterns that play out in real life, with people of consequence.

Interpersonal mediation and group process work develop into common knowledge; We already see the beginnings of this in home-grown courtesy FAQs online.

Activists are more effective, and are well networked with other activists in the area. They have grand meetings, both on regional and topical lines, and have a great time working together.

Businesses re-align to meet the new values system, selling green energy technologies, working in ways that include the clients in construction (Christopher Alexander), transitioning to experiences and supporting community life.

People become wealthier, both individually and as communities, because they're not plowing their money into things that don't bring happiness. A swimming pool for the community, even a poor community, rather than a pool in each back yard, only for the rich.

Whether through the state or community, people provide themselves with health care, and extend out to serve communities elsewhere.

Should disaster strike anywhere, there will be networks of well-connected people who know the area, who care for one another, and can lead themselves and others to safety.

All of this comes from living and working openly.

Meta-intelligence for analyses, decisions, policy, and action: The Integral Process for working on complex issues

Sara Nora Ross[1]

"Children, clean up your mess!" If only the public messes we have made as adults were as easy to clean up as our childish messes were. Instead, we need to investigate, analyze, legislate, negotiate, decide, learn, train, supervise, and otherwise roll up our sleeves to tackle our tangle of messy social, political, economic, and environmental conditions.

It required no intelligence for us to make these collective messes. It requires meta-intelligence to know how to clean them up, and to actually do so. Whether we work in international agencies, governments, think tanks, corporations, NGOs, education, activism, or our own communities, to make long-lasting *positive* changes demands a particular kind of meta-intelligence. My research suggests we can scaffold, co-construct, and deploy collective meta-intelligence *while* and *by* working on complex issues. I posit that a particular range of structured methods are required to achieve results that address complex issues systemically with the requisite meta-intelligence. This chapter introduces a new paradigm for doing just that.

About 20 years of my theoretical and action research, in tandem with analyzing countless issues, suggest practical reasons to distinguish *working on* complex issues from *solving* them. The difference is between pragmatism and

[1] Sara Ross, Ph.D., holds an interdisciplinary doctorate in Psychology and Political Development. She specializes in investigating and applying knowledge of universal patterns to analyze and address real-world problems in all their detailed complexity. She is the founder of ARINA (www.global-arina.org), which is both the home of TIP and the publisher of *Integral Review: A Transdisciplinary and Transcultural Journal for New Thought, Research, and Praxis* (http://integral-review.org).

idealism. The title of the transportable, scalable process I developed reflects that. The acronym *TIP* is the short handle for the long title, *The Integral Process for Working on Complex Issues*.[2] While I occasionally enjoy word play with *TIP* as code for *tipping point,* it is wiser to resist such illusions. There are no magic bullets—not even *TIP*-tipped ones—that will ever make it quick and easy to work on local, regional, national, international, and global issues…much less the whole cloth they weave.

The purpose of this chapter is to serve as a brief primer for the idea of meta-intelligence, using an integration of selected theory, analysis, and innovative praxis. There are three goals. The first is to define some terms and offer some key concepts. The second is to answer the question, What is the meta problem? The third is to answer the question, Why is *TIP* critical to offset the meta problem with meta-intelligence?

Defining Terms and Introducing Key Concepts

My analyses indicate that identical terms can be used by people to mean quite different things.[3] This occurs routinely, though mostly unnoticed. Thus, I start by defining how I use key terms, beginning with those in *TIP*'s title. *Integral* is used in the classic dictionary sense, "essential to completeness," to indicate both analytical and practical comprehensiveness. *Process* means "multiple steps and methods" as well as the progressive individual and collective "transition processes" in thinking, perspective-taking, analyses, syntheses, and motivations that naturally emerge through the steps. *Complex issues* refers to anything, anywhere, that we have on our myriad lists of public concerns. Whether climate change, terrorism, poverty, or a local shortage of affordable housing or good schools, such complex issues are essentially "disputes about our ways of relating."[4] From the local to the global, such disputes about how we should relate to one another involve social, political, economic, and ecological "complexes:" nested layers of issues that exist at multiple scales.

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[2] *The Integral Process for Working on Complex Issues*™ is trademarked and published by ARINA, Inc.

[3] See Ross, S. N. (in press). The challenges of postformal (mis)communications: Speaking different languages. Special issue on Postformal Thought and Hierarchical Complexity. *World Futures: Journal of General Evolution.*

[4] Steve Chilton, July 22, 2006, personal communication.

When I have heard *meta* used, it is often a loosely-applied concept. For reasons I aim to make clear, I use the concept in a particular way, with a theoretical basis that gives it a technical meaning. This enables precision and analytical utility. In my usage of it here, I refer to metasystematic, nonlinear coordinations of at least two sets of systematically-organized information.[5] A set of systematically-organized information represents a complex conceptual system. A complex conceptual system nonlinearly coordinates at least two sets of formal (i.e., if-then or empirical) logics. As a result, systematic conceptual systems are one layer more complex than the if-then logics often used to explain things. Thus, as used here, *meta* indicates a concept two layers more complex than those conceived at the level of if-then logics (Figure 1).

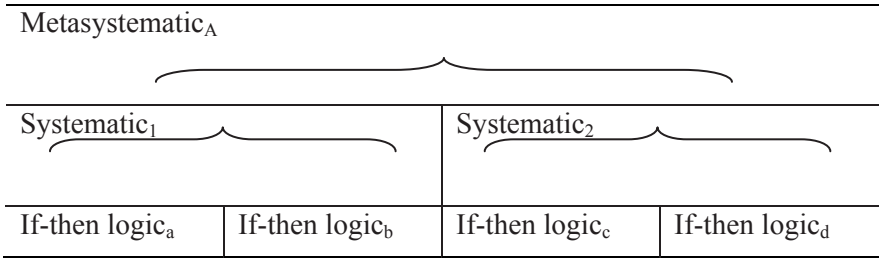

Figure 1: Layers of Conceptual Complexity

What makes this use of *meta* relevant? Metasystematic reasoning is not only more comprehensive by virtue of nonlinearly coordinating widely disparate, boundary-spanning information and competing perspectives. It is also the means by which numerous higher-order principles are formulated and applied in context. These, in turn, guide analyses and methods as well as wise decisions, policy, and action. Comprehensiveness and higher-order principles are two dimensions of meta-intelligence needed to address 21st Century issues.

[5] Commons, M. L., Trudeau, E. J., Stein, S. A., Richards, F. A., & Krause, S. R. (1998). The existence of developmental stages as shown by the hierarchical complexity of tasks. *Developmental Review, 8*(3). 237-278.

In this essay, I pair this technical meaning of *meta* with *approaches, problem,* and *intelligence.* Meta-intelligence underlies meta-approaches. Every thinking person is probably adverse to partial, band-aid policy approaches to complex issues. In practice, it seems to be only in 20/20 hindsight that policies are recognized as the ill-conceived band-aids they always were—whether wars on poverty, drugs, or terrorism, or numerous other intended social reforms. I propose that we can no longer delude ourselves about our delusional band-aid approaches. The strongest normative argument for adopting meta-approaches is that we have managed to ratchet up the stakes to the point where the quality of life—if not survival—of innumerably more people and ecosystems are jeopardized. We cannot afford to *not* invest in meta-approaches.

If that is the case, then what do meta-approaches to complex issues look like? An "approach" may refer to analyses just as much as it may refer to policy-making, decision-making processes, and collective public action. These display infinite variety when it comes to their specifics. However, when it comes to the comprehensive[6] structure or "container" of the approach, such features as the following are discernible.[7]

- They require more time, information, people, and analysis.
- They integrate knowledge of formal *and informal* social, political, and economic institutions when these are relevant to the issue (almost always).
- Their integral scope prevents "technical" problems from being regarded as *only* technical and therefore needing only expert technical fixes.
- They construct a non-partisan, non-parochial meta-analysis to ensure an integral scope, not governed by one ideology, diagnosis, or preferred solution.

[6] Comprehensiveness can be assessed analytically using TIP and subjected to validated quantitative measurement. For the latter, see Commons, M. L., Goodheart, E. A., Pekker, A., Dawson, T. L., Draney, K., & Adams, K. M. (2007). Using Rasch scaled stage scores to validate orders of hierarchical complexity of balance beam task sequences. In E. V. Smith, Jr. & R. M. Smith (Eds.). *Rasch Measurement: Advanced and Specialized Applications* (pp. 121-147). Maple Grove, MN: JAM Press.

[7] These are introduced only briefly due to space limitations. Further discussion is available in TIP and other sources cited herein.

- They ensure that all determinable perspectives, needs, and pre-existing conditions of stakeholders, at all scales, have been systematically incorporated during assessment of both causation and potential changes' short- and long-term impacts.
- They use deliberation in a systematic fashion to weigh, juxtapose, and coordinate all perspectives, needs, and conditions under different scenarios in order to construct meta-combinations of multilateral action tailored to the different scales embedded within the problem being addressed.
- They rely on more dimensions than policy alone to implement changes.
- They are processual and embed regular critical reflection, deliberative action inquiry, evaluation, and adjustment.

Meta-approaches, then, institutionalize awareness of deeply-systemic complexity and methods to deal with it. One might assume they seem slow and arduous compared to business as usual; thus, quick-fix conventional approaches may have more initial appeal. It would be unwise, however, to underestimate the potentially transformative insights and motivations and the long-lasting social, political, and knowledge-building capital inherent in meta-approaches and their principles and processes.

Since complex issues have increased and deepened over time, dissolving their causes and impacts will likewise take time. Indeed, we are long overdue to invest in doing so. When we do, policies and activities of far more substance and systemic impact can go faster, wider, and deeper to launch and sustain systemic change. *The fact that humans do not yet employ meta-approaches to address such issues indicates a meta problem.*

It is possible that a broad survey to ask what is the big problem and the best solution for fixing public issues in general would indicate some common ground akin to this: Policymakers do not listen to people, and they are often biased or bought. Policies are half-baked and unfair to certain constituencies. Policies to fix one thing here cause other problems there. The solution is to listen to people and use their collective intelligence to make wiser policy.

If only it were that simple. My analyses suggest it is not. Rather, I detect a meta problem of many dimensions. Several of those are briefly introduced here. [8]

1. The inherent nature of *all* complex public issues continues to go unrecognized. Two key indicators are the rampant, unexamined assumptions (a) that policy is sufficient to both force and manage change (e.g., "If they are doing this, then we will punish them or make them do that.") and (b) that entire populations do not have hands-on, substantive roles in addressing their issues. Voting does not count; it is an insubstantial, hands-off role (e.g., "I/we vote for you because you promise to fix problems for us. If you do not, I/we will not vote for you again.").
2. We are ignorant about how and why invisible lattice-works of informal social, political, and economic "stakeholder relations" operate, both behind the scenes of public facades and right under our noses, and how and why they consistently thwart change-efforts designed without this knowledge.
3. Our public issues-talk is typified by opinions, assertions, biases, simplistic diagnoses, fact-wars, blaming, and other habits that cast doubt on how much collective intelligence we have to offer. For example, we do poorly at evaluating whether reasoning—our own or others'—is internally consistent and how much (if any) of an issue's complex causation it recognizes.
4. Many are impatient with, confused by, or dismissive of analyses that are more complex and contextually nuanced than solutions-talk based on slogans and slick logics.
5. Adult perspective-taking skills—e.g., flexibility to suspend judgments at least long enough to hypothetically walk in diverse others' shoes—are seriously underdeveloped and no culture on Earth yet supports their development.

[8] See writings listed at the end of this chapter for more discussion.

The meta problem partially represented by these dimensions cannot be reduced to one label that describes an "it" for us to solve. It does, however, indicate that our evolution as a species of thinking, social beings has not yet come to the stage of manifesting much meta-intelligence. Our collective futures hinge on developing such intelligence and bringing it to bear on a wide and growing array of deadly serious issues. How might we start to get "there"?

Why *TIP* is Critical to Provide a Meta-Intelligence Off-Set

Over the last two decades I have repeated the mantra that if it were easy to address complex issues, we would already have done it. My analyses suggest we do not know *how*. I believe *TIP,* as a theory-and-research-based meta-approach, offers a powerful *how*. Its role in offsetting the meta problem is to provide the necessary structure and methods for working on complex issues. It eliminates the need to reinvent the wheels of analysis and method for each distinct issue: its universality makes it applicable to all issues.

We have analogies for this kind of structural universality that eliminates reinventing wheels. Numerous mathematical formulas have been invented to solve complex physics and other problems. Once a formula is invented and proven, users can insert their own content-matter (e.g., measurements) and go through the steps that result in an answer. *TIP* is like a public formula: a content-free structure in which users' information is processed to produce more complex information, policy, decisions, behaviors…and intelligence.

While public issues always have messy dimensions, their inherent complexity need not stymie work on them. I believe one advantage of *TIP* is that it de-mystifies a great deal of public complexity. The troublesome aspects of social, political, and economic complexity—which *we* collectively created over time—are quite susceptible to analytical clarity about what *we* do and do not do at various scales, individually and collectively, and *why* we do and do not do things. We "merely" need methodical processes to (a) help us tease apart such constituent elements, their relationships, and their interactive dynamics and then (b) guide our productive use of all that co-constructed knowledge. These steps (Table 1) eliminate a great deal of mystery about such complexity by unpacking, classifying, and working with its roots.

TIP Step	Purpose	Product or Outcome
1	Develop informed basis to select starting point(s)	Map of the territory.
2	Surface & deliberate differing assumptions that could later confuse or create conflicts.	Alignment toward the goal with clarity about differences.
3	Identify factors of complex causation.	Summary Description of the Issue.
4	Recognize comprehensiveness of action required & what to include.	An "action-system" i.e., a systemic to-do list.
5	Develop the reasoning behind a selected Issue-Question.	A specific question needing deliberative decision-making
6	Expose the array of approaches to the Issue-Question that are driven by different perspectives on it.	Framework of Approaches via template assuring all perspectives are included.
7	Create an informed basis for complex decisions.	Deliberation; Decision Matrix; Decision-making.
8	Assure coordination.	Communication/feedback loops.
9	Effective systemic action, change, or development.	Institutionalization to sustain effort.

Table 1: Outline of TIP Steps

Regardless of the institutional or public venues in which its iterations are used (with a trained analyst or facilitator involved), *TIP* deploys a number of interactive dynamics of human development itself to iteratively accomplish the tasks necessary to address public issues. The tasks become increasingly complex (e.g., Figure 1), each one a building block the next tasks depend upon.

They proceed to the meta level where multiple systems of complex action may be coordinated. Modularity enables considerable flexibility and tailoring, including who is involved, when, and for what practical or political purposes (Figure 2, below).

When numerous efforts to address issues are coordinated and interconnected, a massive web of meta-intelligence-moved-to-action is possible. Such a process can be used for analysis, policy development, and general problem-finding, decision-making, evaluative reflection, and self-motivated action to change behaviors, policies, and priorities multilaterally. My theory is that when approaches use the progressive, dialectically-nonlinear dynamics of development itself to scaffold meta-intelligent reasoning—and more competent ways of relating on the issues that are worked on—adult, social, and political development can be fostered because the natural steps are embedded in the process itself.

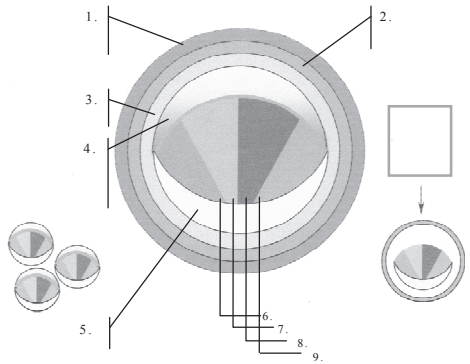

Figure 2: The metasystem of TIP steps & modules

This underlies my hypothesis that meta-intelligence can be fostered *while* and *by* addressing complex issues. This paradigm may be the most pragmatic, comprehensive, scalable, and hopeful approach to offset the meta problem we inhabit in the 21st century.

My most passionate commitment and vision is that meta approaches such as *TIP* become the norm—sooner rather than later—for how we address our local, regional, national, international, and global issues *and* how we come to

recognize the whole cloth they weave. We *must* galvanize ourselves and populations planet-wide with productive methods to build capacities and political will alongside new priorities and reasons for hope and motivation to change many of our current habits, both individual and collective.

Somewhere on a crashed computer disk is a detailed outline of a multi-scaled, international project I designed some years ago to test some of my conceptual models. It was to tackle a NAFTA-related question of significance. By assuming *TIP* methods, I could map a sophisticated structure to develop, and react and respond to, whatever layers of issue-content countries' citizens (including corporate ones) and officials might identify and need to address from their disparate perspectives and self-interests. It built in feedback mechanisms to clarify, refine, and deliberate component issues up, down, and across all scales. This model captured my vision for boundary-crossing development of meta-intelligence *while* and *by* addressing vital issues. Such a model needs integrated computerized support ranging from GIS to new applications designed for transparent, world-wide issue-mapping, analyses, framing, and deliberation as well as for disseminating meta-intelligence-based best practices, policies, and systemic public action. Meta-approaches to construct horizontal and vertical connections from local to global scales, *issue by issue*—while yet only a vision—are possible, necessary, and perhaps our non-negotiable future.

This is a crucial agenda. We must create venues to develop meta-intelligent competencies and invest *now* in meta-approaches to clean up our adult messes. When we do, we may then see meta-intelligent priorities begin to transform our habits and politics, our institutional arrangements, and all else we must do to support life on this planet beyond the 21st Century.

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Collective intelligence: From pyramidal to global

Jean-Francois Noubel[1]

Evolution has provided humankind with specific social skills based on collaboration and mutual support. Today humanity is seeking global wisdom driven organizations.

Abstract

The main stakes for humanity are not hunger, poverty, sustainability, peace, healthcare, education, economy, natural resources or a host of other issues but our capability to build new social organizations to replace those that no longer provide such outcomes. Our main stake is Collective Intelligence.

Today large organizations encounter insurmountable difficulties when dealing with the complexity and the unexpectedness of the world when operating against a global backdrop. They undergo conflicts of interest in many areas—between profitability and sustainability, secrecy and transparency, values and value, individual and collective dynamics, and knowledge fertilizing—that opens—and competition—that closes.

What most medium and large organizations have in common is an infrastructure based on pyramidal hard-coded social maps, command and control, labor division, and a monetary system stimulated by scarcity. Until recently, this social architecture was the only information system at our disposal to pilot and organize complex human edifices. We call it *pyramidal collective*

[1] Founder and President of www.TheTransitioner.org, an international research network and think tank of pioneers who are committed to support the emergence of global wisdom driven organizations. Formerly he was one of the co-founders of AOL France and led an assortment of innovative high-tech companies.

intelligence. It remains efficient as long as the environment remains stable, but it becomes vulnerable and inefficient in fluctuating contexts, namely when markets, knowledge, culture, technology, external interactions, economy or politics keep changing faster than the capability of the group to respond.

Evolution has provided humankind with specific social skills based on collaboration and mutual support. These skills reach their maximum effectiveness within small groups of ten to twenty people, but no more, where the individual and collective benefit is higher than what would have been obtained if everyone remained alone. We call it *original collective intelligence*. As individuals, we all know what it is because it is very likely that we have experienced it at some degree in our lives.

Well-trained, small teams have interesting dynamic properties. These include transparency, a gift economy, a collective awareness, a polymorphic social structure, a high learning capacity, a convergence of interest between the individual and collective levels, interactions characterized by human warmth, and, above all, an excellent capability to handle complexity and the unexpected.

Is it possible for large organizations to benefit from the same properties? Can they become as reactive, flexible, transparent, responsive, and innovative as small teams? Can they evolve even further, toward a global Collective Intelligence? Can they conjugate their interests with overriding concerns of humanity such as ethics, sustainability, etc…? The answer today is a resounding yes. It is not only possible, but absolutely necessary for not just the efficiency of these organizations but above all for the well-being of human society.

The aim of this paper is to provide the key concepts underlying collective intelligence and to explore how modern organizations and individuals can concretely learn how to increase their collective intelligence, i.e. their *capability to collectively invent the future and reach it in complex contexts*. This will draw the guidelines of a universal governance, provide an outline of the next governance paradigms and help us forecast an economy in which competition and collaboration as well as values and value are reconciled.

About collective intelligence

Collective intelligence is neither a new concept nor a discovery. It is what shapes social organizations—groups, tribes, companies, teams, governments, nations, societies, guilds, etc…—where individuals gather together to share and collaborate, and find an individual and collective advantage that is higher than if each participant had remained alone. Collective intelligence is what we term a positive-sum economy.

On a strictly behavioral level and if we exclude the symbolic layer of culture, collective intelligence communities are not exclusively a human prerogative, these are observed within many social animal species, from the ant-hill to the wolf pack and the fish shoal, when the emerging level is manifestly smarter than its individual components.

In human societies, different forms of collective intelligence coexist and mainly coordinate and express themselves in the symbolic space. Let's review them so that we are able to understand the mutation and evolution towards a Collective Intelligence (with capital letters) at the planetary level.

Civilization and collective pyramidal intelligence

Labor division, authority, scarce money, standards and norms

How can the two limits of original collective intelligence—the number of participants and distance separating them—be bypassed? What social machinery could be implemented in order to coordinate and maximize the power of the masses? How could communities of communities be harmonized and synchronized? For tasks such as building, planning, cultivating, transporting or manufacturing and creating such as erecting temples at the glory of the Gods, human works required more and more muscular strength as well as specialization, namely a large number of participants. This was a situation that characterized the beginning of history (defined as the birth of writing) and the early days of large civilizations.

This mutation is absolutely original since it shows almost no perceptible change in our physical constitution, unlike in the animal world. Our brain, our body and our genetic code are the same as they were a few tens of thousands years ago, yet all has changed. The piece is played on another stage, the one of the noosphere—the mind—on which the “invisible” ecology of symbols, myths, knowledge, beliefs, data, is what organizes the social life, visible to our

organic senses (biosphere).

With the invention of the writing, man has open the era (area) of the territory. Signs engraved on physical supports were first used for counting, managing, and norming, lay down the outlines and the surface of a territory, list, define belongings and exclusions, permissions and restrictions.

For the first time, a message was able to circulate without being physically attached to its issuer, in a different time and space. The qualifier, the fact, the counting, the law, the description… objectified themselves in the circulating object graven with symbols, and sealed the object-signifier-signified trio.

This symbolic labeling of the world was also applied to humans themselves. Thus name, profession, qualification, wealth, facts, misdemeanors, caste and lineage became important attributes that positioned an individual in the social geography. Writing is, in essence, the core technology of the State.

Equipped with this extraordinary capacity to send signifiers over long distances toward a virtually unlimited number of recipients, *pyramidal collective intelligence* was launched and gave birth to civilizations and their States.

The four dynamic principles of pyramidal collective intelligence

Four fundamental principles constitute the universal signature of these human edifices, no matter whether these are companies, administrations, governments, armies, religious organizations or empires. These are:

1. **Labor division:** everyone has to cast himself in a predefined role in order to allow people interchange. An immediate corollary is the division of access to information, which establishes a context opposed to holopticism, i.e. *panopticism*—controlled and partitioned information—that we will detail later.

2. **Authority:** from divine right, by affiliation, by merit, by expertise, by law, by diplomas… No matter the legitimating principle, authority institutes a pawl effect, an asymmetry in the information transmission between the emitter and the receiver, and sets up a *command and control* dynamics (C^2). Authority determines the rules,

assigns rights and prerogatives, organizes the territories (thus labor division), and distributes wealth by means of the money.

3. **A scarce currency:** money is historically a social convention and an information system made to allow the market to function. It serves as a medium of exchange and a store of value. Unlike what many people believe, scarcity is not an inherent quality of money, but an artificially maintained property. Scarcity generates channels of allegiance from those who need toward those who have. It naturally catalyzes the hierarchies of pyramidal collective intelligence. This phenomenon of hierarchization is strongly accelerated by the *Pareto effect* (the more we have, the more we earn) that we will explore later.
4. **Standards and norms:** they allow the objectification as well as the circulation and the interoperability of knowledge within the community. Language is itself a standard. As for circulating artifacts (electronic components, pieces of machinery, materials, etc…) they all have a 'jointing pattern' made to chain their added value and build more complex functional sets[2].

The strength and the stability of organizations built on pyramidal collective intelligence largely stem from the fact its four founding principles mutually reinforce and legitimize themselves. Wealth is distributed by those in authority, hierarchies are catalyzed by scarce money, and inclusion-exclusion rules are established by standards and norms, and so on.

Today pyramidal collective intelligence still drives most aspects of human organizations. From the point where the number of participants and the intervening distances exceed that inherent in original collective intelligence, this basic form of such intelligence is no longer possible. By organizing and synchronizing communities based on original collective intelligence, pyramidal

[2] We are not going to detail the difference between 'norms' and 'standards' here. We could also talk about 'culture,' a larger and more evocative universe, but this concept remains too approximate and subject to contradictory interpretation in which we don't want to enter for now.

collective intelligence has permitted creating and governing of cities and countries, invention of aircraft, launch of satellites into space, establishment of gigantic armies, conducting musical symphonies, discovery of vaccines, etc…. Furthermore, during the past 120 years, the rapid growth of telecommunications has significantly increased the growth in and power of this form of collective intelligence.

The past 120 years, the rapid growth of telecommunications has significantly increased the levers of power of this form of collective intelligence.

The pyramidal intelligence has an Achilles heel: unlike **original collective intelligence**, *it shows a structural incapacity to adapt to the moving and unpredictable grounds of complexity*.

In some way these are the weaknesses of its strength:

- **Work division:** the social architecture (organization charts, job descriptions, information access levels, etc…) is hardcoded. There is no way this structure can self-modify when confronted with changing circumstances, for example as in the case of a sports team. Whatever the efforts made to improve and optimize the flow of information, the intrinsic limits of hierarchisized structures will always show up, with their pawl effects and their dynamics made of territories and prerogatives;
- **Authority:** top management, nearly always reduced to ruling minorities, are by nature unable to perceive and process the tremendous flow of information that pours into the large body of the organization they are supposed to manage. This generates reductionist visions that become a source of conflict between the 'head' and the base;
- **Scarce money:** scarcity breeds competition which minimizes collaboration, that is the capacity to self-adapt;
- **Standards and norms:** most of the time they are subordinated to a logic of competition. They serve a strategy of territorial occupation and monopolistic control by means of artificially rarefying knowledge (patents, intellectual property, etc…), rather than maximizing the permeability and the

> interoperability with the external environment. The most obvious example in the computer world is Microsoft Corporation's Windows operating system, the core of most microcomputers. The end user is dependent on the future evolutions of this code, must struggle to evolve into other environments, and must pay for any extra desired services such as licenses, labels, trainings, etc.

Indeed today's organizations are larded with infrastructural and human 'cabling' that are made to counterbalance the weaknesses of strict hierarchical architecture: information systems, intranets, KM, project oriented organization, works councils (that shuffle human relationships), ERP, HR management, etc. But the fundamental structure remains, based on the industrial dynamics of mass transformation via the principle of economies of scale.

Today humanity suffers cruelly from the limits of organizations based on pyramidal collective intelligence. Their deficiency in face of systemic complexity is expressed by a common symptom: the fact they wander into directions that can be opposite to the will of their own participants, either because internal coordination is virtually impossible, or because leaders use *de facto* opacity—even cultivate and legitimate it—to take advantage of their power.

Toward a global collective intelligence

The human, by nature, is always in search of a higher level of consciousness that allows him to guide and understand his present condition. This quest happens at the individual level and throughout all humanity.

Original collective intelligence *transcends* and *includes* the individual. It *transcends* as a differentiated *emerging entity* appears; it *includes* the individual in a harmonious relationship that fosters his/her evolution and provides his/her meaning.

It seems that neither pyramidal collective intelligence nor swarm intelligence have proven to be able to *transcend* and *include* original collective intelligence. However, these two forms of large-scale organizations appear like transitory and necessary steps in evolution. Today, everything seems to show that THE transition toward a new level of consciousness at the humanity scale—and not only in small groups—is at work.

Everywhere *new social species* become observable in humanity. They possess the same characteristics as original collective intelligence (adaptability, direct connection between the individual and the emerging whole…) without its limitations (number of participants and distance between them). What these new communities have in common is social software and a new culture.

Social software—or socialware—consists in online shared software designed for self-governance, self-organization and self-actualization. It offers communities a wide new range of social dynamics and organizational possibilities that were not available in pyramidal collective intelligence. Collective memory, creativity and representation, asynchronous and synchronous spaces for conversation, tools for project management and consensus building, infinite virtual 3D interactive worlds are examples of such new spaces. Wikis, blogs, tagging, social networks, social bookmarking, backlinking, transclusion, Linux, open source and free software are current words and concepts that players in this new world are familiar with.

This paradigm shift is easy to observe at the technological and social levels. It is also observable sociologically as a cultural shift everywhere on the globe, nourished by disenchantment with materialism and hedonism, and stimulated by limitations of pyramidal collective intelligence. Sociologist Paul H. Ray and psychologist Sherry Ruth Anderson coined this new population carrying this shift as *cultural creatives*. Cultural Creatives develop beyond the current paradigm of Modernists versus Traditionalists or Conservatists[3]. This culture is growing worldwide[4]; it is now building its identity and social structures.

Cultural Creatives are now grabbing new technologies for global governance, seeking to develop organizations that operate at a more embracing and encompassing level of awareness, at local and global levels.

Global wisdom driven organizations, and not just vitally driven organizations, might become a possibility in the near future.

Collective intelligence as a new discipline

Invent the tools for a universal governance (global, local, transversal,

[3] The concept was presented in 2000 in their book *The Cultural Creatives. How 50 Million People Are Changing the World* (Harmony Books, NY).

[4] Recent surveys prove this is growing in every country, finding from a few % up to a likely 30% in the USA.

transcultural, etc…) while developing practical and immediate know-how for today's organizations, through an ethics of collaboration.

> The issue of collective intelligence is to discover or invent a hereafter of the writing, a hereafter of the language so that information processing is everywhere distributed and coordinated. It shouldn't be the prerogative of separated social organs, but, on the contrary, it should naturally integrate with all human activities and come back into everyone's hands.
>
> Pierre Lévy—*Collective Intelligence*

Definition

It is time now to present a short definition of collective intelligence as a phenomenon, whether this is the original form or the global scale version (Collective Intelligence):

> *Collective intelligence is the capacity for a group of individuals to envision a future and reach it in a complex context.*

Certainly Collective Intelligence deserves to become a full discipline, with its formal framework, its empirical approach, its tools, its measuring instruments, its practical applications, and its ethical field?

Field of Collective Intelligence as a discipline

The Cartesian mechanistic thought process has fractioned the universe into three territories that are impervious but not antagonistic to one another: matter, life and mind. Each could only belong to one fief or kingdom; otherwise it would risk contradictions and schizophrenia. Physics doesn't explain poetry; neither does psychoanalysis explain cellular division. If we stay enclosed within this discontinuous space, research into and application of Collective Intelligence is a potpourri composed of mostly social and human sciences including arts, mathematics, theology, spiritual development, metaphysics, etc…

Actually the discipline of Collective Intelligence is fundamentally in keeping with the vast decompartmentalization process that animates the thought of this new millennium. Matter, life, and mind—physiosphere, biosphere and noosphere—are part of the huge evolutionary strides the universe is taking toward ever more complexity and higher consciousness. In this world

everything is connected to everything, each thing possesses at the same time an inner dimension (that has to be *interpreted*), an outer dimension (that we *perceive*), an individual dimension (the *agent*) and a social dimension (the *population*, the *society*)[5].

So the science of collective intelligence has for its object the study and the optimization of the inner-subjective and outer-objective emerging properties of communities. Its aim is to augment their being, evolution and fullness capacities. By doing so, it invents the tools for a universal governance (global, local, transversal, transcultural, etc…) while developing practical and immediate know-how for today's organizations, through an ethics of collaboration.

[5] See Ken Wilber. Integral Naked, at http://in.integralinstitute.org is his current web site. His older personal site is http://wilber.shambhala.com. See also the Wikipedia page, http://en.wikipedia.org/wiki/Ken_Wilber.

Cultivating collective intelligence: a core leadership competence in a complex world

George Pór [1]

Introduction: good news and bad news are the same

Hierarchy, as the dominant form of organization is becoming irrelevant to meet the challenges of the current tsunami of increasing complexity. Every new turn of scientific and technological development increases the size of the complexity waves coming at us and all our institutions. There's no way to turn our back on it and run.

The bad news is that most organizations are stuck in a form of organizing their value-creation processes and relations with their internal and external stakeholders, which is increasingly inadequate to our fast-changing world.

The good news is that it inspires renewal, including new forms of organizing work, governance, learning, and commerce, better poised to face the multiple challenges of our global situation. There's a narrow, safe passage through the looming Perfect Storm. Our best chance to go through with the least casualties lies in mobilizing all that we have to outsmart it: the wisdom of

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women and men, youth and elders, future-responsive change agents and communities in business, government, and civil society.

No effort to upgrade our systems to sustainable ones will be successful without re-inventing economics. Fortunately, that re-invention is already in motion. Here is one of the numerous signs: "The Gartner Group identified the technologies it believes will have the greatest impact on businesses over the next 10 years, naming such hot areas as social-network analysis, collective intelligence, location-aware applications and event-driven architectures… Collective intelligence was rated as potentially transformational to businesses… Collective intelligence was defined as an approach to developing intellectual content, such as code and documents, through individuals working together with no centralized authority..." [2]

We can also observe the impact of CI on economics in the increasing popularity of such concepts as wikinomics, open source, communities of practice[3] , user-driven innovation, peer production, social entrepreneurship, etc.

The common themes in all those phenomena are:

- They re-unite purposeful work with the passion of play.
- They are their participants' source of new meaning-making frameworks.
- Their success is based on activating the collective intelligence of all stakeholders.
- They are frequently used for meeting high-stake problems and opportunities.

Why we need CI—the epistemological crisis

CI is as old humankind itself. What is new is how deeply and broadly we need to integrate local and non-local intelligences to survive and thrive. Where does that need come from? "Ashby's law of requisite variety states that the

[2] http://www.informationweek.com/story/showArticle.jhtml?articleID=191900919

[3] See: "Liberating the Innovation Value of Communities of Practice," by George Pór, in the *Knowledge Economics: Principles, Practices and Policies* textbook (2005)

complexity and speed of an actor's response have to increase with the complexity and speed of change in the environment." [4]

That law is dealing with the two aspects of cognitive complexity, which we can label as "differential and integrative complexity." They refer to the variety in "the dimensions or scales against which one tries to evaluate a stimulus (differential complexity), or consider in producing an output (integrative complexity." [5]

While cognitive complexity is on the rise in all dimensions in society, business, technology and almost all dimensions of modern life, there's an even stronger factor calling for CI in all those areas. It's what Otto Scharmer termed "generative complexity." [6] Exposed to the conditions of increasing cognitive or generative complexity, an organization has to strengthen its nervous system, its network of connected conversations that matter, and connect its CI with the CI of neighboring players in its surrounding ecosystem. That's a fundamental condition for "emergent collective leadership." [7]

The challenge that individuals are facing is even more biting. They were simply not designed to keep up with the incoming waves of ever more complex challenges and velocity of "internet time." There's a capability gap both at the individual and collective level. It calls for new frameworks, methods, tools, and practices for upgrading our current collective intelligence to CI 2.0.

To make better sense out of the fast-changing, kaleidoscopic pictures of our technical and knowledge landscapes we have to dramatically enhance our meaning-making strategies by learning from one another's.

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[4] Huizing, A., Maes, R., and Thijssen, J.P.T., 2005, *Educating Professionals: Leveraging Diversity in Globalizing Education*, PrimaVera Working Paper 2005-13

[5] Cashman, A. M. and Stroll, D. 1986, "Achieving Sustainable Complexity through Information Technology: Theory and Practice," in: *Proceedings of the Conference on Computer-Supported Cooperative Work*

[6] "[G]enerative complexity deals with disruptive patterns of innovation and change. You don't know what the solution is and you may not even know exactly what the problem is, because it's still evolving. Most importantly, you don't know who the key players are with whom you need to get involved." Scharmer, O. (2005) *Theory-U: Presencing emerging futures* http://mitsloan.mit.edu/newsroom/newsbriefs-0605-scharmer.php

[7] Johnson, N.L., "Science of CI: Resources for Change" (in this book from page 265).

There is always an ecosystem of such strategies, at all scales: from individuals, families and friendships, to communities, organizations and global systems. The problem is that we are so used to our own mental frames and models of what is meaningful that exploring someone else's is almost never heard of. Yet, it is exactly what we need to become very skillful at.

It is common knowledge that information relevant to any particular profession is produced much faster than the capacity of that field's professionals to make full sense of it.

What good is it to have a potential solution to a problem if the parts of that solution are distributed in the knowledge, faculties, and experience of a large number of players, without ways to integrate them? In that question there is a shorthand summary of today's epistemological crisis. It is not simply one of our numerous global crises but a horizontal one that cuts across many of the others and is causal to their deepening.

The challenge streams that make up our global problematique grew increasingly interdependent but our ways of knowing remain fragmented. One can observe the same phenomenon at the organizational level, as well. The gap between the demand of its environment and the organization's response to it, grows proportionately with the depth of knowledge silos, a hallmark of hierarchy-based organizing.

We know more and more about less and less. Specialization is rapidly expanding, whilst meeting complex technical, social or business challenges increasingly requires a systemic view and building on the mutual reliance between individual and community intelligence.

What is collective intelligence?

As the meme “collective intelligence" is spreading fast online and off-line, so is the range of significance associated with it. For some, it is a “wisdom of crowds,” for others it is an inter-subjective field of energy that comes into being when people interact from a position beyond ego, just to name two of the popular branches of CI.

In the contexts in which I use, most frequently, the term “collective intelligence,” it refers to the capacity of human communities to evolve towards higher order complexity and harmony, through such innovation mechanisms as differentiation and integration, competition and collaboration.

Social sciences define CI from their own perspective. Researchers of CI tend to describe it from the lens of the discipline with which they are approaching it. For example, my definition reveals its origin in evolutionary sociology. It doesn't collide with, rather it complements another definition that comes from the perspective of cognitive psychology:

"Intelligence" refers to the main cognitive powers: perception, action planning and coordination, memory, imagination and hypothesis generation, inquisitiveness and learning abilities. The expression "collective intelligence" designates the cognitive powers of a group.—Pierre Lévy, Canadian Research Chair of Collective Intelligence

Looking at CI as the capacity of human groups to evolve, we see a compound capacity and the cognitive dimension is a significant part of it. So are emotional intelligence, social intelligence, and spiritual intelligence.

There are many other names for CI, which emphasize its different dimensions. Economics calls it "intelligence of markets," meaning the intelligence of the "invisible hand" that arranges for meeting human needs by matching supply and demand through the price mechanism. The performance of that intelligence reminds me of the bumper sticker that says, "If you think the system works, ask someone for whom it doesn't."

We can also look at CI through the lens of political economy, where it was introduced as "general intellect." "General Intellect consists in a number of competences that are inscribed in the social environment organized by capitalist machinery, and hence available freely to its participants, by virtue of their existence as 'social individuals'.

These competences can be cognitive, as in technical or scientific knowledge, but they are also social and affective..." [8] In another language, we would talk about the intellectual, social, and structural capital of an organization. Using those terms, one can assess its CI by the extent to which they are aligned and harmonized. A further resource that illuminates the many forms and meanings of CI is Collective Intelligence as a Field of Multi-disciplinary Study and Practice.[9]

[8] Adam Arvidsson, "Ethics and General Intellect, Chapter 2 in *The Ethical Economy*, online at http://www.p2pfoundation.net/Ethics_and_General_Intellect.
[9] By Tom Atlee and George Pór - http://www.evolutionarynexus.org/node/606

Cultivating collective intelligence

Cultivating collective intelligence is a dimension of leadership work, which can be neglected only by risking severe system failures when facing the complexity tsunami. As a leadership competence, CI means—and can be assessed by—at least, three things. It is having what it takes to: develop principles and practices of collective leadership; awaken and engage the power of "whole person" intelligence; and guide the development of collective sensing organs.

Develop principles and practices of collective leadership

Once, as an advisor sitting in the meeting of the leadership team in a division of a major Canadian financial organization, I heard the division head telling his staff, "I feel really vulnerable when I have to make a major decision without having the possibility to consult my team due to the urgency of the situation." Looking at the expression on the face of the participants at that meeting, I knew that they knew it to be true; those were not just a polite gesture. More and more organizations are discovering the need for collective leadership but acting on it—by developing its principles and practices—is far less frequent.

"A system has 'collective leadership' when people are attuned to each other so well that, even when separate, they naturally act in harmony with each other and the goals of the common enterprise. Most leadership teams, including those at senior levels, are far from fulfilling their potential. They meet as individuals, squeezing time from their more urgent work, debating from their individual perspectives and concentrating on their individual domains of authority. Their actions, and the actions of those who report to them, consequently take place at cross-purposes, and they often seem trapped in cycles of opposition and breakdown." [10]

[10] *Leadership for Collective Intelligence*, by William Isaacs
http://www.dialogos.com/materials/LCI2005Mkt.pdf

Guide the development of collective sensing organs

The neural networks in living systems, biological or social, are not the source but vital enablers of CI. "The nervous system of the global super-organism has a potential to enable the emergence of a collective intelligence, the same way as organic nervous systems enable the emergence of intelligence in living systems." [11] "The functions of such nervous systems include:

- To facilitate the exchange and flow of information among the subsystems of the organism and with its environment.
- To effectively coordinate the harmonious action of the subsystems and the whole.
- To store, organize, and recall information as needed by the organism.
- To guide and support the development of new competences and effective behaviors." [12]

"Collective sensing mechanisms use the power of shared seeing and dialogue to tap an unused resource of collective sense-making and thinking together." [13] Some questions worth asking are: How can groups and organizations upgrade such collective sensing organs as their knowledge networks and self-organizing knowledge ecosystems? How to improve the organizational functions supporting and being supported by them?

We know that collaborative meaning-making at all scales of human groups is a key condition and our best chance to adapt, survive, and thrive. In this chapter, I use the term "meaning-making" as in: "recognizing relevance in patterns of relationships between ideas, information, and inspirations."

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[11] "Designing for the Emergence of a Global-scale Collective Intelligence: Invitation to a Research Collaboration," by George Pór

[12] "The Quest for Collective Intelligence," by George Pór, in the anthology *Community Building: Renewing Spirit and Learning in Business*, http://www.amazon.com/Community-Building-Renewing-Learning-Business/dp/0963039059

[13] Scharmer O. (2007) *Theory U: Leading from the Future as It Emerges*, Cambridge, MA: Society for Organizational Learning, 2007

Given the above, enhancing the performance of our sensing organs is more urgent today than ever. What can leaders do in relation to that? What should leadership teams committed to boost the CI of their organization do? There's no recipe book that could give us the answers but two tasks appear to be more and more certain.

> 1. Create conditions for collective presencng: "Leaders need to create these spaces where people can reflect, sense, and then prototype and implement." [14]
>
> 2. Future-responsive leaders shape the culture and structure of their organizations as to make them more available to benefit from the CI-enhancing potential of such Web 2.0 tools as blogs, wikis, forums, tags, and social networking mash-ups.

CI and collective wisdom

An intelligent person is not necessarily a wise one. A team or a community with a high collective IQ is not necessarily a wise community. One form of CI tends to be wiser, more evolved than another if an authentic, collective self, rather than a collective ego drives it. What does that mean?

"One of the most intriguing aspects of collective intelligence is its relative independence from individual intelligence. It is clear to most students of the field that a group of intelligent people will not necessarily manifest group intelligence. Nor will a coalition of intelligent groups necessarily add up to an intelligent coalition. Nor will making all organizations intelligent, by itself, produce a collectively intelligent society," wrote Tom Atlee, one of the founders of the CI field.[15] He proposes, "Wisdom characterizes any factor that facilitates greater positive engagement with more of the whole."

[14] Scharmer, O. (2005) *Theory-U: Presencing emerging futures* http://mitsloan.mit.edu/newsroom/newsbriefs-0605-scharmer.php

[15] "Thoughts on Wisdom and Collective Intelligence" http://www.community-intelligence.com/blogs/public/2004/07/thoughts_on_wisdom_and_collect.html

Atlee's insight suggests that a collective, systemic wisdom is present when a group or an organization is capable to see, think from, and act on patterns that connect its contexts, from the smallest to the largest. That capacity is a function of the organization's developmental stage.[16]

My working hypothesis is that the broader access all members get to the pattern-seeking and meaning-making activities of the organization, the wiser its collective intelligence may become. I'd be glad to verify this with organizations aspiring for the "wisdom-driven" moniker. Any takers?

What is ahead—Augmenting CI from within

If any of the above makes any sense to you at all, you may ask, where to start with the upgrade of your organization's CI from its current level to CI 2.0? The best place to start augmenting CI is within oneself. That's because "CI is embedded in us, in two ways:

> 1. We are products of the co-evolving intelligence of life itself. Not to mention our ancestors in the mineral, plant, and animal kingdoms, we are products of many millennia of social evolution. We couldn't have language, tools, not even our most intimate thoughts and feelings, without the long journey of CI marking stages in humankind's history.
>
> 2. We are connected through our various networks, the nerve endings of which are inside our own existence. The nervous system of a group, enterprise, or other social holon, is the network of conversations that constitutes it. Participating in meaningful conversations, we may pursue our various individual agenda, and as a by-product, we help the *imaginal cells*[17] of our CI to connect into larger patterns of meaning." [18]

[16] See: "What color is your collective intelligence"" http://www.community-intelligence.com/blogs/public/2004/05/the_wisdom_of_crowds_and_the_c.html
[17] http://www.community-intelligence.com/blogs/public/2004/05/the_collective_intelligence_of.html
[18] What Is My Collective IQ? - Boosting CI from Within http://www.community-intelligence.com/blogs/public/2004/10/what_is_my_collective_iq_boost.html

Given that, notice in how many conversations, shared learning journeys, and collaborative projects you can participate before spreading too thin; just how many "friends" you can have on Facebook or the other social networks before emptying the concept of "friends" of any value. In contrast, if you limit the number of learning relationships to those that matter the most, chances are that your *CI that is part of you* will grow faster. So does your contribution to the *CI that you are a part of.*

The art of hosting conscious evolution

Mountain climbers pick a peak, then as they move towards it, they look down at what is in front of their feet, the next step ahead. From time to time, they also look up, asking, are we still in the right direction of the peak? We have just looked at the next steps of cultivating CI. Where is the peak that can inform our direction? Depending where we are on our life's journey, we may see different peaks. Future-responsive leaders whose worldview is embracing the next stage in the development of self, organizations, and societies, choose the art of hosting conscious evolution, as the highest peak worth climbing. If you are one of them, get ready for the expedition, collect your team, your sherpas, your equipment, and your courage. Good journey to you!

An expanded version of this chapter is available from the author, george(at)community-intelligence(dot)com

Empowering individuals towards collective online production

Keith Hopper[1]

Solving Problems Collectively

The widespread proliferation of online participatory systems such as wikis and blog networks helped popularize the idea of collective intelligence. Value that emerges from these systems shows that a whole system can appear more intelligent than any individual contribution. As these online participatory systems continue to broaden in application and increase in sophistication, they take on a more targeted and significant role as tools to accomplish focused, productive work. More specifically, online environments will be constructed to collectively solve complex and multifaceted problems. Imagine the possibility of adjusting aspects of an existing, productive online community in order to stimulate the ideal resolution of specific problems, much like a marketplace might be arranged over time to produce the most efficient and valuable transactions.

Existing participatory systems are designed to separately invite online user contributions in one capacity, and to aggregate collective value in another, but few environments attempt to holistically address the production of useful outcomes by moving participation towards meaningful and intelligent results. This determined focus on how best to design participatory environments to

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solve problems is particularly relevant given the world's abundance of complex and urgent problems to be addressed. Methods for solving them collectively online have only begun to be explored.

Required Focus on the Individual

The recent surge in Internet contribution—as witnessed by the growth of video and photo sharing and the ubiquity of blogging—has created an odd duality. On one hand, this mass participation holds great promise for building collectively intelligent environments. On the other hand, it is only through the individual motivations of the participants that contributions originate. It is solely the whim of the individual that drives the potential for collective intelligence online. This issue is difficult to embrace when the majority of collective intelligence discourse focuses on the sweeping collaborative potential and not the nuances of individual behavior.

In 1911, William Morton Wheeler observed the collective behavior of an ant colony and labeled it as a "superorganism". Given the impact of this insight, it is good that he did not instead focus on the importance of why one ant follows another ant's trail, but this is exactly the type of concentration that the field needs today. Observing overall group behavior and studying the often surprising outcomes of collective systems builds excitement but yields little in the way of guidance when trying to construct these systems. The understanding of individual's behavior in a collective system helps determine the best design and adaptation of online systems to stimulate intelligent and specific outcomes. Looking at individual motivations to participate becomes critical in understanding how adjustments in the rules, interfaces, and mechanisms of online systems can be used to yield more intelligent outcomes.

Designing Systems That Work

Decentralized peer production environments hold more promise in directing participatory systems towards collectively intelligent outcomes than the traditional approach of using centralized authority to drive individual behavior. The success of open source software development and wikis suggests that production environments based on autonomous individual action have the most potential for large-scale, enduring participation. These systems provide individual freedom and choice for interacting with resources and projects without any single authority dictating individual behavior or focus. It is precisely the individual's response to the freedom inherent in a decentralized system that triggers the desire to participate.

Words like "harness" or "leverage" used to describe value produced through individual participation signals a misguided perspective of centralized authority controlling participants. Seeing individuals as a ready resource to be wheedled and mined for value is, at best, a misunderstanding of how distributed production operates, and at worst, a setup to failure. Individually-motivated activity is the cornerstone of successful participatory environments, and presuming participation while undervaluing the individual causes contributions to evaporate. Cajoling effective production, dictating behavior, and exploiting contributions is inherently counter-productive to participatory environments. Empowering the individual creates beneficial outcomes and cultivates an environment where these contributions are most valuable.

Since the best participatory environments exist to serve individuals and address their interests first and foremost, the heavy-handed, centralized actions or exploitation of participants corrupts an online collective environment irreparably. Ideally, participants develop a feeling of ownership over the environment, and providing such an atmosphere is indispensable to ensure the environment's continuance.

Designing participatory systems is difficult. The most typical challenge is in obtaining a volume of effective participation. New environments struggle to reach critical mass, while existing environments constantly work to provide the right environmental characteristics to attract valuable contributions and distill value back to participants. These difficulties are becoming more common, as an onslaught of online applications now competes for the attention of contributors, and single participants are stretched thin across multiple environments. The question becomes where to focus when designing decentralized systems in order to stimulate effective participation.

Motivating Effective Participation

Enticing the individual to participate can be challenging, and assuming any one driving force is counterproductive. Investigations by Steven Weber in *The Success of Open Source* and Yochai Benkler in *The Wealth of Networks* both highlight that no single motivation can explain voluntary peer production for all participants. Additionally, several intertwined motivating factors are likely within a single individual, creating an unpredictable and complex understanding of contributors.

Due to the highly social nature of online participation, traditional behavioral economics do not apply. It is unlikely that extrinsic motivators, such

as financial incentives, provide the panacea to driving effective participation. In fact, financial rewards can negatively influence intrinsic motivations, thus resulting in an overall decrease in effort and participation. Existing participatory systems often make the mistake of assuming contributors are either self-serving or, alternatively, relying on contributors to act only towards addressing a larger, socially beneficial outcome. Contributors, however, are neither purely selfish, nor solely altruistic. Participant drive includes a complex mix of intrinsic and extrinsic motivations that vary by individual.

Participatory systems should focus fundamentally on freedom and autonomy for individuals while presenting irresistible situations for self-directed activity. Furthermore, whether creating an environment that constructs solutions for world peace or one that asks users to upload a photo, this focus on individuals is indispensable. With this in mind, creators of participatory systems should:

- Stimulate unbounded, creative opportunism by providing a commons, or shared set of freely-available resources, which individuals use without concern for waste or misuse
- Cultivate hope and possibility by helping individuals see potential outcomes and avenues to take advantage of potential opportunities
- Offer complete control, ownership, and attribution over what can be contributed, publically viewed, and used by others
- Encourage playful experimentation by providing a safe environment that allows individuals to correct mistakes and reduces their social and financial risks
- Support individual acknowledgement by providing opportunities for contributions to be seen and recognized by a worldwide audience
- Offer varying levels of engagement so participation can grow and change over time
- Stimulate productivity through tools that allow a breadth of novel and creative application

Novel Approaches to Complex Problems

The potential for collectively intelligent systems in the pervasive and interconnected environment of the Internet is unprecedented and essential. The large, complex problems of the world must be addressed through novel approaches that ensure progress towards resolutions.

These challenges will require environments designed to stimulate widespread individual participation and emergent, mutually beneficial outcomes for all.

While it may seem counter-intuitive to focus on the behaviors of individual contributors when thinking collectively, understanding individual behavior and motivation holds promise for designing participatory systems that yield significant results.

To ensure success, collective systems must embrace voluntary, independent participation in a decentralized environment while motivating individuals by supporting the freedom and autonomy of self-directed production.

Who's smarter: chimps, baboons or bacteria? The power of Group IQ

Howard Bloom[1]

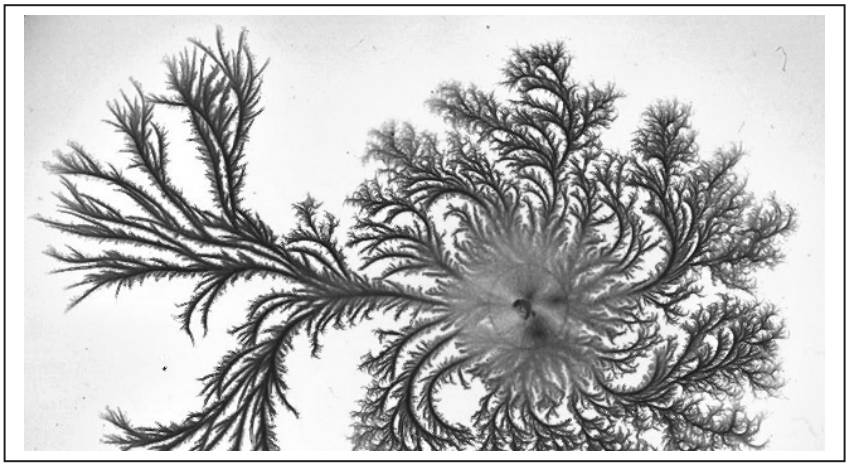

Figure 1: Bacteria exploring new territory and sharing information on their finds. Courtesy of Eshel Ben Jacob.[2]

[1] Howard Bloom is the author of *The Lucifer Principle: A Scientific Expedition Into the Forces of History* ("mesmerizing"—The Washington Post) and *Global Brain: The Evolution of Mass Mind From The Big Bang to the 21st Century* ("reassuring and sobering"—The New Yorker). A former Visiting Scholar at NYU and a former core faculty member at The Graduate Institute, Bloom is the founder of three international scientific groups—The Group Selection Squad, The International Paleopsychology Project and the Space Development Steering Committee.

[2] Eshel Ben-Jacob is a pioneer in theoretical biological physics. As with green chemistry and bio-mimicry, science is now discovering the depth of biological

Which have bigger brains, chimpanzees or baboons? If you guessed chimps, you're right. Chimpanzees are our closest relatives on the planet. They share between 98.6% and 99% of our genes, depending on who's counting. They are way up there in animal brainpower. An average chimp's brain is more than twice as large as the brain of a baboon.

Now for question number two. Which are smarter, chimpanzees or baboons? The answer is…baboons. But how could that be? Chimps are brainier. Shouldn't they also be, well, umm, brainier? Brighter by far? If baboons are winners on IQ measures, doesn't that mean that intelligence is not just a matter of brain matter? The answer is yes, there's more to intellect than the number of neurons in your skull. So what's the extra ingredient you need to turn brains into smarts? The answer is a bit surprising. Nimble minds need more than just a lot of synapses between brain cells. They need the power of groups. They need a force that pulses from the web of connection between group members…from the sum that's bigger than its parts. They need what Gerardo Beni calls "swarm intelligence," what Tom Atlee and Robert D. Steele call "Collective Intelligence" and what I call "Group IQ."[3]

What in the world is Group IQ? For a hint, let's look at the very first creatures to self-assemble on this planet. Let's look at our oldest ancestors, the creatures who pioneered life on the early earth over 3.5 billion years ago, bacteria. A bacterial species that comes readily to mind is Eschericia coli. Eschericia coli is one of your most faithful companions. It lives in your gut and mine. It's also a bacterial species microbiologists can't keep their hands off of. It thrives in petri dishes and shows off its stuff in ways that are easy for a curious researcher with a good microscope to see. And, like baboons, E. coli are much, much smarter than most of us think.

E coli are sugar junkies. Their favorite food is glucose. But when times get tough and the foods they like the most are nowhere to be found, they've got genetic tools they use to reengineer their string of genes, their genome, and their metabolism so they can eat far less tasty stuff, milk sugar—lactose. However there's a substance E. coli have seldom come across in their long

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intelligence that human have yet to achieve. See Professor Ben-Jacob's remarkable art gallery and substantive science at http://star.tau.ac.il/~eshel/gallery3.html.

[3] "Social IQ" refers to an individual's ability to interact with others, rather than the outcome of the collective engagement of many individual IQs in harmonization.

history on this planet. It's a chemical from the bark of poplars and willow trees. Its name is salicin.

We use salicin as a pain killer. It's the key ingredient in aspirin—a drug we didn't begin to crank out in mass quantities until 1897. So in the 1980s and 1990s, several researchers decided to throw E. coli a curve. They gave colonies of these creatures nothing but salicin to eat. Now this is a bit like asking you and me to invent a new way to grow our gut and to retool the metabolic machinery of our cells so we can digest aluminum foil, gobbling it up like carrot cake, using it as our favorite food.

Solving the salicin problem, the problem of turning salicin into an appetizer or an entrée, is a tough one. It involves a mutation, a big change, in your genome, a change that carries you forward a giant step but gets you essentially nowhere. Then it takes another big step with no payoff—rejiggering your genome in a way takes you backward—that makes you even LESS capable of eating and surviving than you were before. Only then can you take the big step forward in the reengineering of your gene-string that lets you eat salicin with ease. The odds against pulling off this big step forward, this big step back, and the final step forward again are huge. The odds against the trick are especially staggering if you think a bacterial colony is mindless and that it makes all of its changes using the genie-in-the-bottle of today's mainstream evolutionary theory, Neo Darwinism. The Neo Darwinian magic mechanism for change and upgrade is random chance, random mutation. The odds of reengineering yourself to make salicin by random mutation alone—without a group brain—are ten billion trillion to one. Why?

Because according to Neo Darwinian evolutionary theory, a big step backward like the one in the salicin two-step will kill your species off. Any bacteria who try it will be goners. They won't live to reproduce and pass their new mutation on. So no way should a chain of mutations happen in which one step cripples something as basic as your ability to eat.

Yet E. coli can reliably pull off the trick of reengineering their genes so they can eat salicin. How in the name of heaven or hell do they do it? The answer comes from one of my partners in crime, Eshel Ben Jacob, head of the Israeli Society of Physicists, former head of the Physics department at the University of Tel Aviv, and a man whose close to 20 years of breakthrough research in microbiology have landed in the queen of the science journals,

Nature, and on the cover of The Scientific American. Ben-Jacob is also kind enough to tolerate me.

A colony of bacteria the size of the palm of your hand is populated by more citizens than all the human beings who have ever lived. The number of bacteria in that colony can vary from one to seven trillion. Each one of these trillions of bacteria has its own equivalent of a brain. It has what Ben Jacob calls a computational engine. That computational engine is its genome.

Computer scientists discovered something interesting back in the 1980s. If you wanted to make a supercomputer for a lot less money than the ones that used to come at huge cost from the Cray Computer Company back in those ancient days, you had to abandon linear processing. You had to ditch the notion of threading all your information just one step at a time through one central microprocessor. You had to hook up a few dozen or a few hundred microprocessors and let them take their crack at the problem simultaneously. If you let your swarm of microprocessors operate in parallel, the "parallel-processing" gizmo you produced was a supercomputer. And it cost one tenth the price of a Cray Computer…or less.

Bacteria use the same trick. They use parallel distributed processing. And, frankly, so do you and I. We do it in our brains—communities of 100 billion nerve cells working on problems simultaneously. And we do it in our cultures—collective-thinking frameworks that pool our thoughts with those of our ancestors. But bacteria use parallel distributed processing in even more powerful ways than us human beings. Remember, there are over a trillion citizens, a trillion one-celled organisms, in a normal bacterial colony. Those bacterial cells spread out like members of a search party looking for a lost kid in a meadow. The object of their search? Territory rich in food. They talk to each other constantly, gossiping about their woes and their big scores, their discoveries of groceries, of enemies, of disasters, and of poisons. Their language of their chatter is chemical. They send out biochemical gradients of attraction and repulsion signals—chemical come-hithers and go-aways. When a high-priority problem hits, no single bacterium works on it by herself. The whole colony pitches in. That means between one trillion and roughly seven trillion microprocessors mull over a problem simultaneously. It also means that a trillion or more microprocessors spread out on the terrain are sending their reports in.

Together, those trillion nano-processors make something utterly beyond the power of any single individual. They make something no single individual can even sum up or see. They generate what Eshel Ben-Jacob calls a creative web. They make a collective intellect capable of formulating problems, testing solutions and then, of all the amazing things, literally retooling, upgrading, and reinventing their own central string of genes—their own genome.

Now that is collective smarts. That is collective intelligence. And it began 3.5 billion years ago when bacteria first evolved on this brand new planet earth. And I do mean that this earth was brand new when the first collective intellects emerged. This planet-in-the-making was still being smacked by comets and planetesimals. With each asteroid that thwomped it, the earth woggled like a pudding. And bacteria apparently outwitted the thwompings. The earth was a tricky and a challenging place when the first bacterial colonies got their group brains up and running. In other words, the earth was an intelligence tester par excellence. And bacteria passed the tests.

The number of really big problems bacteria have solved since then is staggering. They've rejiggered their genomes so they can eat sulfur and rock. They've reengineered their genome so they can live two miles below the surface of the earth where the pressures are beyond belief and the food—granite—is on a par with driveway gravel. They've retooled themselves so they can live in a flood of radioactive particles that would kill off you and me. And there's speculation that they've even learned to survive two miles above the ground in clouds and that they've learned to manipulate the weather so that the rains and sun give them the saunas and the food they love the most.

What's more, we've picked the brain of the bacterial mass mind more than we care to confess. We've stolen invention after invention from our single-celled sisters. Our antibiotics are the weapons of mass destruction, the chemical weapons, with which two colonies of bacteria or more make war. Our genetic engineering kits are made of the tools bacteria use to reengineer their own genome. The tools behind our genetic engineering are plasmids, phages, and transposons. And we stole every one of them from the tool belt that bacteria wear. What's more, our gherkin, herring, and sauerkraut processors recruit massive teams of bacteria to pickle food. Our cheese makers seduce vast armies of bacteria to make our cheese.

And here's something even more surprising. You use bacterial powers all the time. You are a collective intelligence of 100 trillion cells. As we've seen, a

hundred billion of those cells participate in the collective intelligence you think of as just one thing—your brain. But here's a bigger surprise. Half of your hundred trillion cells don't even claim to be you. They're huge bacterial colonies living in your throat, your gut, and on your skin. Without them you'd be dead. In your pores bacteria turn what you exude into the sweet or sour smell that folks who've fallen in love with you have been attracted to…or that have made other folks edge away on those days when you've forgotten to use deodorant.

More important, in your gut, bacterial colonies take things you can't digest and finish the digestion process off for you. Their deal is that you feed them their favorite foods and they will munch them, they'll shit out what they can't digest, and their excrement will be on a par with honey and ambrosia to you. They'll crap out the raw fuels that power you. What's more, other bacterial colonies in your gut make your vitamin P, your vitamin K, and some of your B vitamins for you. Without your interior bacterial support team you couldn't survive. To the bacteria inside of you, you are just a convenient self-guiding transport vehicle, a terrific food-gathering, and food-grinding machine. So next time you eat a chocolate éclair, remember there's a lot of it that you can't do much more than chew. You're relying on bacterial teams to do the real digesting for you.

I already mentioned that bacteria adapt to radioactivity. They've invented ways to thrive in the water pools used in nuclear reactors. Radioactivity periodically shatters their entire genome. Without a genome, you can't survive. But these bacteria—the Deinococcus radiodurans —have built compression and storage systems that allow them to hold on to their critical data and reconstruct their genome over and over again. Now think about that for a second. That is the work of high IQ. That is research and development on a scale we can't imagine. That's the working of a collective intelligence and more, a collective innovation-and-breakthrough machine.

OK, so I'm claiming there have been collective intellects since life began on this planet 3.85 billion years ago. This might easily make you wonder, if I'm so smart, and if all this is true, can we give group intellects an IQ test? The answer is yes. Here's the proof:

The ultimate test of intelligence is adaptability—how swiftly you can solve a complex problem, whether that problem is couched in words, in images, in crises, or in everyday life. The arena where intelligence is most important is not

the testing room, it's the real world. When you measure adaptability by the ability to turn disasters into opportunities and wastelands into paradises, bacteria score astonishingly high. But how do big-brained chimpanzees and small-brained baboons do? Or, to put it differently, how adaptable, clever, mentally agile, and able to solve real-world problems have chimpanzees and baboons proven to be?

You can tell by the number of appeals made on TV, radio, and print made to save these primates' tails. Jane Goodall has toured the world alerting us to a simple fact. The environment that allows chimps to live is rapidly disappearing. To save the chimps, we must save the environmental niche that gives them life. How many activists have you seen pleading with you to save the environment of baboons? None. Is there a reason? Yes. Baboons have been called "the rats of Africa." No matter how badly you desecrate their environment, they find a way to take advantage of your outrage. One group, the Pumphouse Gang, was under study for years by primatologist Shirley Strum. When Strum began her baboon-watching, the Pumphouse Gang lived off the land in Kenya and ate a healthy, all-natural diet. They ate blossoms and fruits when those were in season. When there were no sweets and flowery treats, the baboons dug up roots and bulbs.

Then came disaster—the meddling of man. Farmers took over parts of the baboons' territory, plowed it, built houses, and put up electrified fences around their crops. Worse, the Kenyan military erected a base, put up homes for the officers' wives and kids, and trashed even more of the baboons' territory by setting aside former baboon-land for a giant garbage heap. If this had happened to a patch of forest inhabited by chimps, the chimpanzee tribes would have been devastated. But not the baboons.

At first, the Pumphouse Gang maintained its old lifestyle and continued grubbing in the earth for its food. Then came a new generation of adolescents. Each generation of adolescent baboons produces a few curious, unconventional rebels. Normally a baboon trip splits up In small groups and goes off early in the day to find food. But one of the adolescent non-conformists of the Pump House Gang insisted on wandering by himself. His roaming took him to the military garbage dump. The baboon grasped a principle that chimps don't seem to get. One man's garbage is another primate's gold. One man's slush is another animal's snow cone.

The baboon rebel found a way through the military garbage heap's barbed wire fence, set foot in the trash heap, and tasted the throwaways. Pay dirt. He'd hit a concentrated source of nutrition. When they came back to their home base at the end of the day, the natural-living baboons, the ones who had stuck to their traditional food-gathering strategies, to their daily grind digging up tubers, came home dusty and bedraggled, worn out by their work. But the adolescent who invented garbage raiding came back energetic, rested, strong, and glorious. As the weeks and months went by, he seemed to grow in health and vigor. Other young adolescent males became curious. Some followed the non-conformist on his daily stroll into the unknown. And, lo, they too discovered the garbage dump and found it good.

Eventually, the males who made the garbage dump their new food source began to sleep in their own group, separated from the conservative old timers. As they grew in physical strength and robustness, these Young Turks challenged the old males to fights. The youngsters' food was superior and so was their physical power. They had a tendency to win their battles. Females attracted by this power wandered outside the ancestral troop and spent increasing amounts of time with the rebel males—who continued to increase their supply of high-quality food by inventing ways to open the door latches of the houses of the officers' wives and taught themselves how to open kitchen cupboards and pantries and who also Invented ways to make their way through the electrified fences of farmers and gather armloads of corn. The health of the males and females in the garbage-picking group was so much better than that of the old troop that a female impregnated in the gang of garbage-pickers and farm-raiders was able to have a new infant every eighteen months. The females in the old, conservative, natural-diet group were stuck with a new infant only every 24 months. The innovators were not only humiliating the conservatives in pitch battles, they were outbreeding them.

Why were the baboons so much smarter than chimpanzees? Why were they able to innovate and to surf the waves of change and the currents of the strange? Because they didn't just think as individuals, they thought as a group. Their individualistic, curious adolescents were antennae, probing the possibilities of the unknown. These explorers and innovators sometimes went off on their own while the main troop broke up into small groups to do their wandering. But at night the small groups and individualists gathered to sleep together in crowds of from a hundred to seven hundred. And in the morning, through body-language

arguments between the males about where to go during the day, these groups and rebels shared information, they compared notes.

Chimps are not wanderers. They are stick-in-the-muds and stay at homes. They patrol their existing territory. And they live in groups of a mere fifteen to 35. They don't get together in nightly multi-group conventions to compare notes.

The result? When the old environmental slot of chimps wears out or is wiped away, they have no options, no fallback, or, more important, no fall-forward positions. Baboons have smaller brains. But they have smarter Group IQs. And they can turn any environmental challenge you toss their way from disaster into opportunity. Chimps cannot.

Here's an additional guess about why the group IQ of baboons is higher than the group IQ of chimps. When chimps fission, when one group of chimps separates and becomes two groups, those two groups eventually replace peaceful competition with war. And I mean a war in which the losing group is exterminated…in which its adult males are murdered down to the last one and in which only the most delicious females, the fertile ones, are kept alive. When baboon groups fission, the groups compete with a far less genocidal form of violence. They have fights, brawls, gang bangs, and bullying sessions. They use their might and hurt each other. But they don't wipe each other out. They don't kill each other. They don't pursue systematic genocide.

The result is that the alternative strategies pursued by each baboon group—the alternative hypotheses—live on in the baboon mass mind.

The bottom line? Baboons are on the increase in Africa. Chimps—despite their relatively humongous brains—are on the path to extinction. And that increase or shrinkage is a direct measure of adaptability, a measure of intelligence, a numerical indicator of group IQ.

Another lesson, especially for the group of thinkers represented in this book—to have a high collective IQ, it's not enough just to have a group and to parcel out the job of thinking in a nice, egalitarian manner.

Structure makes all the difference in the world.

Especially structure that uses individuals, small groups, and the collection of those groups into larger units, units that can share information. Structure that harvests the force of both competition and cooperation. Baboons have this sort

of competitive-cooperative-individualist-mall-group-plus-big-alliance structure. Chimps do not.

And there's another bottom line. Our social and psychological sciences have utterly ignored the study of collective intelligence, of Group IQ. Eshel Ben Jacob's pioneering work on bacteria, for example, has appeared primarily in physics journals, not the journals that explore the secrets of the social body and of the psyche. And swarm intelligence has been largely relegated to the artificial intelligence, robotic, and computer communities. That's a mistake. To raise our own Group IQ, it's time for us humans to dig a little deeper and to study the inner secrets of social organization among our fellow organisms on this planet—bacteria, chimps and baboons.

A Collectively Generated Model of the World

Marko A. Rodriguez[1]

The world, for some reason, is not random. All non-random information can be compressed into a simplified description called a model. The purpose of a model is to capture the essential characteristics, or patterns, of the original system. Every living organism makes use of some model of the world. Sometimes a world model is encoded solely in the genetic structure of the organism and other times, the model is simultaneously represented neurologically in the organism's plastic, neural network. For example, the human skeletal structure is equipped to expect a particular amount of gravity pulling it downward towards Earth and the human eye expects a certain amount of sunlight for it to function. Gravity on Earth, through the ages, has remained constant. Likewise, the sun burns in a relatively stable manner. The human genetic code accounts for these consistent, non-random properties of the world and uses them to create a well-adapted organism capable of reproducing. Neurologically, the human brain builds a model of the world. Over time, it learns the grammars of language, expects particular culturally driven behaviors from others, and more generally, realizes an enormous amount of social and environmental patterns. This neural-encoded model represents those worldly variations that enable the human to make utility-driven, non-random decisions. A good mental model of the world yields a well-adapted, successful individual. At the level of the collective, a good collectively generated world model yields a well-adapted, successful society.

[1] Marko A. Rodriguez is currently conducting research at the Los Alamos National Laboratory in Los Alamos, New Mexico. The best place to find Marko is through a Google search of his name or physically in Santa Fe, New Mexico.

There are many definitions of intelligence. For the purpose of this short essay, let intelligence be defined as the ability to identify patterns in the world, encode these patterns in some medium, and utilize this patterned medium to make useful, non-random decisions. For example, through experience, a human will learn to categorize a collection of unique, yet related set of experiences as *x* (e.g. a red traffic light). The human will also realize that every time generalized pattern *x* occurs, generalized pattern *y* occurs some constant amount of time later (e.g. cars will come to a stop at the traffic light). There are various mechanisms in the human cortex that support the encoding of this simple realization. Once encoded, the human can then make decisions to act on *y* only moments after *x* has been perceived and before *y* has occurred (e.g. begin to walk across the street). For humans, the world is not a constant, unfolding novelty and they themselves are not constrained to a constant process of trial and error. Instead, the world is a set of categorized abstractions that have consistent relationships to one another and can be used to make well-informed decisions. The human mind suppresses world novelty for the purpose of utility-driven decision-making.

At the collective level, many individuals work in parallel to discover the patterns of the world. The various mechanisms of communication ensure that these patterns are shared between individuals. For example, human *a* can tell human *b* that pattern *y* always follows pattern *x*. Human *b* thanks human *a* and goes about his or her merry way knowing not through trial and error, but through communication that when *x* occurs, expect *y*. The moment that organisms communicate worldly patterns is the moment that collective intelligence emerges. If intelligence is defined as the ability to find abstract patterns in the world, encode them into a medium, and utilize that patterned medium to make well-informed decisions, then collective intelligence is defined as the ability for a collection of individuals to find abstract patterns in the world, encode them into a shared medium, and utilize that shared medium to make both well-informed individual and collective decisions. In its earliest stages, human collective intelligence was made possible through auditory language. Later, the written word provided a way to efficiently store models through time and distribute them more easily across space. In recent years, with the development of the World Wide Web, there currently exists a universal shared medium by which individuals are able to encode their world models for others to use. For example, during a decision-making process, an individual may read any number of web pages on a particular topic in order to learn more

about the issues surrounding the decision they need to make. The many encoded world models contained in this collectively shared medium has greatly advanced the human's ability to understand the patterns of the world and make informed decisions in various aspects of their life.

The advancement of collective intelligence is the advancement of the means by which patterns are encoded and utilized to support decision-making at both the individual and collective level. The current instantiation of the World Wide Web is just a step along the path that humans are taking towards modeling their world. Further modifications will include mechanisms that automatically detect patterns in the world, represent those patterns, and utilize those patterns. In other words, the senses, the data model, and the algorithms of our collectively shared medium will continue to increase. A collectively shared medium that can analyze the deluge of information signals coming into it to locate patterns will provide the means by which this medium learns. A flexible data model that is able to represent any knowledge form in a computationally efficient manner will greatly increase the utility of the world model. Finally, fundamental general-purpose algorithms that are able to exploit the world model in useful ways will greatly aid humans in both their individual and collective decision-making processes. As advances in these respective areas are made, the means by which human's think will change. What cognitive effort the human expends on today's decision-making tasks will be moved to a more efficient medium. No longer is the individual required to actively search for information to solve a particular problem or make a particular decision. Instead, this search process can be executed for the individual automatically and thus, greatly increase the efficiency and accuracy of the individual's decision-making processes.

Suppose a city with no sidewalks where people can drive their cars anywhere they please. If two friends were to take a walk in the city they would not be able to share an uninterrupted stress-free conversation as some of their cognitive effort would be focused on detecting and avoiding cars driving in their path. Now suppose the introduction of sidewalks and the typical road rules associated with them. Due to sidewalks, these two friends need not worry about the state of traffic and instead can discuss and analyze the world at a higher-level of abstraction. The problem solving effort of vehicle detection is made negligible though a medium whose meaning is reciprocally agreed upon by drivers and pedestrians. As stresses of the modern world are further reduced,

the human mind will be left to explore and exploit different worldly abstractions. If human daily choices are made explicit and solved by a more astute medium, then such tasks as which place to spend one's time, skills and efforts will require less and less cognitive effort on behalf of the individual. The human will be left with a new problem set—a new view of the world.

As technology advances, humans will continue to contribute to the creation of a shared world model. This world model will become richer, more accurate, and over time, better than humans at understanding the patterns of the world. Such a universal model will help drive decision-making at both the individual and collective level. Ultimately, this collectively generated world model will allow the human to explore other areas of the experiential landscape without being burdened by the problems that the man of today's society must expend cognitive and social effort dealing with.

Science of CI: Resources for change

Norman L Johnson[1]

If you are reading this book, then very likely you are a believer in collective intelligence (CI)—and likely a champion. My history begins in the mid-90s when a group of similar-minded scientists at Los Alamos National Laboratory considered the future of the Internet—the Symbiotic Intelligence Project.[2] Collectively we had a vision that individuals using the Internet for their own needs would create a new problem solving capability—a *symbiotic intelligence*, far greater than humankind had seen before. Why did we think a new resource was needed? Even a decade ago faster change and greater interdependency across the planet were creating challenges too complex for the current leaders and organizations. Many of the contributors to this book perceived the same needs and saw that some form of CI was the missing resource for organizations and humanity. At the time we absolutely believed in symbiotic intelligence, but we were deeply afraid that those in power would repress its development, because it could be viewed as a threat. Luckily this book and many efforts like it have proven that CI is alive, proliferating across many practices, and is promising to be the ultimate resource for change.

This contribution focuses on the science side of CI—necessary for the understanding and development of CI resources. The emphasis is on topics that have not been examined in other contributions, reflected in the following questions—each a section heading. 1) What is unique about the Internet that will enable CI to unite all peoples, worldwide? 2) Why is diversity essential for CI? 3) Must we all have the same vision and goals for CI to work? 4) How can the collective solve a problem when the individual can't even understand the solution? 5) Is CI a competitive, cooperative or synergistic process? 6) And

[1] Dr. Norman Johnson recently became Chief Scientist at Referentia Systems, after 25 years at Los Alamos National Laboratory as a scientist and manager. Because the message is more important than the messenger, see http://CollectiveScience.com.
[2] http://CollectiveScience.com/SymIntel.html

finally how does CI fit into traditional models of leadership? A science perspective provides much-needed tools for understanding the workings of CI and establishing a foundation for the next generation of CI resources.

1. Symbiotic Intelligence: The Future of Humans and IT systems[3]

As many contributors to this book observed, CI is not new—in fact, every social organism from slime molds to social insects to social primates have evolved social structures and the supporting dynamics which enable them to "solve" problems that threaten or limit their existence. What is new is that these CI processes, and new ones yet to evolve, are now applied at unimaginable scales (numbers and spatial extent) than previously observed. This is significant because self-organizing social organisms are observed in nature to have an upper limit in size and extent. For example, beehives will divide into two parts upon reaching a critical number, because above this size the performance of self-organizing processes decline. The cells in a heart above a certain volume cannot coordinate beating, and a heart attack is likely. Even the development of human languages may be driven by the size of the self-organizing social structure, as in India where 100s of incompatible languages occur even without geographic boundaries.

What is unique about the Internet that enables larger numbers over greater extent to self-organize? The Internet has three significant, arguably unique, capabilities beyond prior human-technology systems: 1) *breadth*—the ability to connect quickly, globally heterogeneous systems, 2) *depth*—the ability to capture and retain details of the access and use of information and 3) *accuracy*—the ability with minimal loss to relate and transmit information. All of the modern implementations of CI on the Internet exploit these unique capabilities. For example, the Amazon's product referral system requires rapid access to detailed purchasing histories of individuals (and not bestseller aggregations) with no loss of information. The same is true for Google's recommender system. These unique capabilities overcome the prior thresholds of size and extent previously observed in human-technology systems. And it captures knowledge that was previously lost: when you retrieve a reference from a book on our shelf, only you benefit from it—on the Internet, all can benefit from it. It is fortuitous that the same Internet that created the global challenges of faster change and greater interdependence also provides humans

[3] IT – Information Technology, see http://CollectiveScience.com/SymIntel.html

with the resources to meet these challenges. Or maybe it is not fortuitous – contingency planning is observed routinely in self-organizing systems that continually create innovations!

2. Collective Intelligence: Diversity, Diversity, Diversity

Other contributors to this book have documented how collectives can outperform the average individual and often the expert. Fig. 1 illustrates graphically the relative utility of the individual and the collective (the figure is modified from a book that examines CI in finance[4]). If the problem is simple, all individuals solve the problem well. But as complexity increases, the expert typically has skills or information that increase their utility. At some threshold of complexity—a complexity barrier—even the experts (or groups or organizations, depending on the scale of the problem) are challenged and their utility declines. The notional curve for the collective captures why many think CI is important. But under what conditions does the collective have utility and what are the limits?

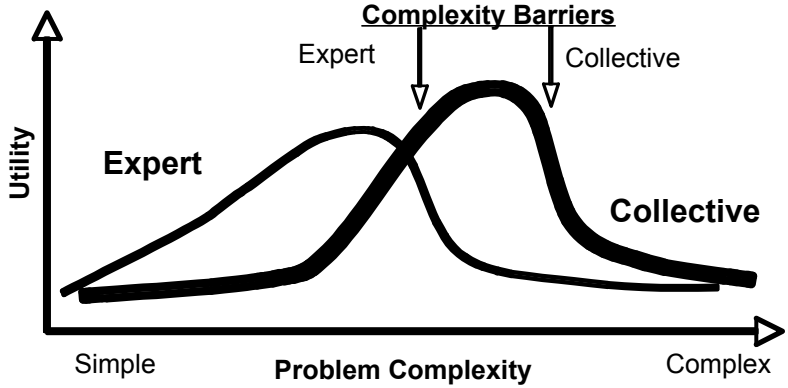

Figure 1: The utility of the expert and collective with increasing complexity

In 1998, this author did an extensive study[5] of how the combined information from a collective of independent individuals can solve a hard problem—a maze—better than the average individual and often better than the

[4] Mauboussin, M. J. (2006). *More than you know: Finding financial wisdom in unconventional places.* New York: Columbia University Press.

[5] Johnson, N. L. (1998). *Collective problem solving: Functionality beyond the individual*. http://CollectiveScience.com/Documents_1/NLJsims_AB_v11.pdf

best individual in the group. An analysis found that this CI performance correlated with the uniqueness of each individual contribution to the collective information or, in general, the diversity of the individual contributions. In fact, the study found that diversity, even in performance, was more important than having the best performers in the group. This conclusion reflects the intuition and empirical studies captured in many chapters of this book where diverse groups solve problems better than experts—for complex problems, as reflected in Fig. 1. This result was so unexpected that a reviewer of this paper stated in 1998, "I don't see what is wrong, but it can't be right." Some good ideas are before their times.

A familiar example captures how this form of CI occurs. We all have observed that ants have a remarkable ability to find the shortest path between the dropped potato salad and their nest and that they use their pheromone trails (not their odometers or GPS units!) to accomplish this. Suppose that every ant took the same, non-optimal path initially between the food and the nest. Of course, this collective can only find one path—the wrong one, so it is easy to see that a diversity of path solutions is essential for the ants to find the shortest path. *The maze study discovered that when the collective finds the shortest path, no one individual is actually taking that shortest path. Instead, the collective shortest path is a composite of diverse individual contributions.* In the ant foraging, only later does one ant and all take the shortest path.

In the maze study, the CI of the group was also found to decline as either the individual performance declined or as the complexity of the problem increased. A way to view this is that the collective solution amplifies the weak signals of the individuals. If the problem is too complex, individuals only contribute noise, and the CI is not observed. The collective curve in Fig. 1 captures these conclusions. If the problem is simple, any individual can solve the problem so there is no utility in CI. But as the problem becomes more complex, the individual is challenged by the individual complexity barrier and requires CI to find the optimal solution. And finally, if the problem is too difficult, then even the collective hits a "collective" complexity barrier, and the utility of CI declines.

Scott Page in his book, *Differences*[6], captures these results in a general "diversity prediction theorem" (a rearrangement of the variance theorem):

[6] Page, S. E. (2007). *The Difference: How the power of diversity creates better groups,*

Collective error = {Average individual error}—{Prediction diversity}

This theorem illustrates the importance of diversity in the CI solutions. The collective error is reduced as the prediction diversity increases. And why the collective utility declines as the complexity increases: if the individual error increases as the complexity increases, then the collective error also increases. These are powerful conclusions about the utility of CI.

3. Compatible Worldviews—A Requirement for CI Synergy

While diversity of the individuals is the primary requirement of the self-organizing CI, another requirement is that the diverse contributions must be compatible. Many facilitators can relate horror stories how major conflicts arise in groups that are "too" diverse. This requirement is often captured as: the individuals agree on goals or objectives. Certainly this is one way to achieve compatibility, but in a complex world where individuals come together with different starting and ending points, a less restrictive requirement is essential. In the maze study discussed above, the conclusion was that compatibility is only required at the decision points where diverse information is combined.

A simple example of this is the foraging ants. Suppose there are multiple food sources that are sufficiently close such that part of the optimal path overlaps. In this example, even though the goals (food sources) may be different, the ants can benefit from the commonality in parts of the path. The human equivalent is commonly called the "water cooler effect": how often do you run into someone that has exactly the piece of information you need for your problem, often by accident, even though your savior does not have the same goal as you. Something to consider: is it possible that it's not an accident, and our gregariousness is designed to make this magic happen?

A way to capture this common "worldview" is to agree on options at each decision point. This does not mean that every individual must have the same preferred option, just that they agree on the set of options. When two individuals have a different set of options, then the options that are not common often become the source of conflict. As many facilitators know, often restating the problem (and creating a different decision path) can create worldviews that are compatible. For example, consider the following two problem statements. Unwanted births can be achieved by terminating pregnancy. Healthy

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teams, schools, and societies. Princeton, NJ: Princeton University Press.

communities value all their members. The first leads to an immediate disagreement on options, while the second invites synergy of ideas.

4. Sweet Spot of CI: Between Competition and Cooperation

The main reason that the many believe that a diverse collective cannot outperform an expert is because the dominant paradigm for group performance is from competitive processes: competition between smart individuals finds the best solution—the social equivalent of Darwinism. Doesn't your organization hire the best and reward the top performers? So it is unthinkable that a diversity of individual performance is preferred over a team of high performers. Yet, every manager that I've met can relate an instance where magic happened in a diverse team. Part of the answer to resolving this conflict between paradigms lies in Fig. 1: for problems of moderate complexity, engage the expert to solve the problem, but as the complexity increases beyond the ability of the expert, a diverse collective is needed to solve the problem. But here's the problem: we think the way to get a diverse collective working well together is through cooperation. But many contributors of this book warn of the hazards too much cooperation: group-think and herd mentality. Herein lies the challenge: how are the different collective performance paradigms related and how does a group transition from competitive to cooperative?

In studies of self-organizing systems[7], three different mechanisms for collective performance are observed and typically are sequential in a developmental process: 1) *Formative*: the group improves by the improvement of individual performance via competitive processes, 2) *Synergistic*: the group improves by the synergy of individual differences via the diverse CI processes discussed above, and finally, 3) *Condensed*: the group converges on an optimal solution, through cooperation and often codification. In the ant foraging example and in Fig. 1, all stages are captured. For moderate complexity problems, individuals can competitively solve their local path problem, while the collective "synergistically" discovers the global optimal path, and later most individuals "condense" to the best collective solution. For simple problems, one ant finds the best solution, and the collective condenses to this one solution—

[7] Johnson, N. L. (2002). *The Development of Collective Structure and Its Response to Environmental Change*. *S.E.E.D.* Journal, ***2*** (3), 84–113. http://www.library.utoronto.ca/see/SEED/Vol2-3/2-3%20resolved/Johnson.htm

the synergistic stage is skipped. Or for difficult problems, the synergy of the diverse group may never occur and the system will remain in the first stage.

The above reinforces the earlier guidance of matching the performance processes to the complexity of the problem. The developmental view of self-organizing systems provides additional guidelines: 1) collective performance develops in predictable stages—enable rather than fight these—for example, if the problem is challenging for the individuals, then competitive processes may dominate even when synergistic or cooperative processes are desired, 2) increasing rates of change (a type of complexity) will force a self-organizing collective to earlier developmental stages, 3) in dynamic environments the performance and robustness of the synergistic stage is a sweet spot and, 4) beware of the lack of robustness of the optimized, low-diversity condensed stage.

5. Emergent CI: When the Individual Is Clueless & the Is Collective Smart

Many of the above science-based concepts of CI are intuitive and are aligned with the observations found in other chapters. But there is also an aspect of the above studies that is profoundly challenging, yet at the same time, possibly the greatest potential of CI. Again, we use the ant foraging example to illustrate the concept of emergent CI. As mentioned earlier, the collective finds a shortest path even though an individual does not have the resources to know if their path is optimal or even better. In essence, the individual is contributing to a global collective solution—the shortest path—that cannot be understood by individual. This is a classic example of an *emergent property* commonly used in complexity studies: when a global property cannot be determined from knowledge of the components. In the foraging examples, the shortest path is an emergent property. But because the individuals cannot comprehend a shortest path, these systems also express emergent problem definition, where even the global problem definition is not understood at the individual level.

Some examples of human emergent problem definition and solution are illustrative. The first example is the Bali water distribution system[8] where along a typical river, small groups of farmers meet regularly in water temples to locally manage their irrigation systems. What is remarkable is that the

[8] Lansing, J. S. (2006). *Perfect order: Recognizing complexity in Bali*. Princeton, N.J., Princeton University Press.

distribution of water is globally optimized by these local rituals to large changes in the total water flow, ensuring water for everyone along the river. Interestingly, there is no evidence that the local rituals were planned to have global optimization. While it is an outstanding research problem of how such an emergent CI system evolves, the two essential observations are that 1) by each group focusing on their own problem, the system self-organizes to a global optimum—to the benefit of all and 2) the local groups are not aware of the global optimization, although all the groups of farmers benefit from this emergent CI. A second example is the fall of Berlin wall—one that caught the world by surprise. It was not predicted, nor was it planned in any localized sense: the individuals that participated in the process that led up to the event never had that goal, nor knew that this was a possible outcome of their activities. It just happened as an emergent CI solution to a collective problem. There are likely many examples of emergent problem definition and solution in the history of humans, but because historians are not generally appreciative of CI, these emergent CI solutions are attributed to individuals.

6. Leadership and Collective Intelligence

Collective intelligence is a threatening concept to many leaders: how can a leader be a leader if they defer their intelligence to the collective? One way of packaging CI so that it is more acceptable is to capture it as another form of leadership. This repackaging of CI has proven to be readily digestible to a wide variety of particularly diehard leaders, such as physicians and scientists, possibly because traditional forms of leadership are being challenged and the availability of more powerful resources for leadership is attractive, if not essential. The following builds on the concepts discussed above.

Many lament the lack of clarity in the field of leadership, for example, Cecil Gibb: "The concept of leadership has largely lost its value for the social sciences, although it remains indispensable to general discourse."[9] To stay above this swamp the approach taken here is to observe the broad shifts in leadership theories:[10] 1) the shift of the basis of leadership from power or

[9] Gibb, C. (1968). "Leadership: Psychological Aspects." *International Encyclopedia of the Social Sciences*. D. L. Sills. New York, Macmillan. **9**, 91-101.

[10] Hazy, J. K., J. A. Goldstein, et al. (2007). *Complex Systems Leadership Theory: New Perspectives from Complexity Science on Social and Organizational Effectiveness*. Mansfield, MA 02048, ISCE Publishing.

structure (sustaining a leadership position by rules) to performance and 2) the shift from localized leadership to more distributed leadership. Two conclusions directly result, respectively: 1) leadership should include all processes that lead to higher performance—specifically CI, and 2) CI is the best framework to understand distributed leadership.

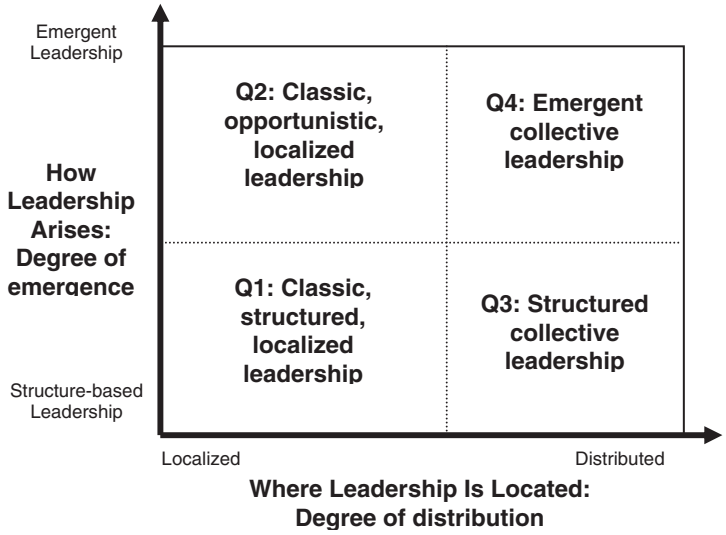

Figure 2: A Leadership Landscape with CI included (right column)

To capture the intersection of CI and leadership, a landscape, as in Fig. 2, is defined[11] with one axis being "*How leadership arises: degree of emergence*" and the other "*Where leadership arises: degree of distribution.*"

The *degree of distribution* is the number of individuals required for a leadership decision (the emphasis is on the decision and not the execution of the decision) and ranges from one for a single leader to the entire group.

A quantitative measure for emergence is challenging at best and is a controversial topic of research. For the current context, the *degree of emergence* is defined as the difference between the number of flexible, synergistic, or

[11] Johnson, N. L. and J. H. Watkins, "Emergent Collective Leadership: The Next Frontier of Decision making", in progress

unpredictable interactions needed for the leadership decision minus the number of prescribed interactions supporting the decision, all divided by the sum of these two numbers.

This emergence metric ranges from -1 for rigid, rule-based leadership to a number approaching +1 for highly emergent leadership. For simplicity, as in Fig. 2, the landscape is divided into four quadrants. The quadrants Q1 and Q2 represent respectively the classical types of leadership: localized power or structure and emergent leadership as in a hero. The quadrants Q3 and Q4 capture the two extremes of CI: the structural-based CI[12] such as democracies or information-enabled CI to the emergent forms of CI discussed above.

This leadership landscape is an ideal framework to summarize the science-based CI discoveries presented in this chapter. We began with research on how the synergy of humans and the Internet may solve the hardest problems facing humanity, captured by the CI leadership resources (Q3-Q4) in Fig 2. We then found that diversity is the essential requirement for CI performance. Therefore, as leadership resources move to the right of the landscape, diversity of the collective must be developed and expressed, and "leaders" will become facilitators of the collective wisdom. We also found that as the complexity of problems increases, the collective will perform better and be more resilient to change. Therefore, to better address the modern challenges of faster change and greater interdependence, the CI leadership resources (Q3-Q4) must be better understood, developed and utilized.

Finally, the greatest challenge but also the greatest opportunity is to enable the leadership processes of emergent CI (Q4) where global solutions are found by individuals solving their own local problems, but where the emergent solution is possibly beyond individual understanding. To enable emergent CI, individuals must not only express their diversity, but also share a common worldview—developed by greater understanding, openness, and acceptance of each other.

[12] Watkins, J. H. and M. A. Rodriguez (2007). "A Survey of Web-based Collective Decision Making Systems." Submitted for publication.

Collectively intelligent systems

Jennifer H. Watkins[1]

From a psychological perspective, the laundry list of ways in which humans fail to make good decisions is extensive. Cognitive biases, as they are called, confound a sizable portion of our thinking. An individual may use a few salient examples of negative comments from her boss to conclude that she is going to lose her job (attribution bias). She subconsciously begins to seek out additional information confirming this belief, ignoring the fact that she just received high marks in her annual performance review (confirmation bias). Eventually, her fear over losing her job affects her performance enough that she is fired (self-fulfilling prophecy) and when she looks back she can say with total confidence that she saw it coming the whole time (hindsight).

When we consider individuals acting in a group, the situation only worsens. Indeed, if we are to believe the anecdotes of MacKay's mad crowds,[2] when people act together their worst characteristics are only magnified. More recently, this phenomenon has been characterized as groupthink, the bane of every boardroom. In fact, if we refer to the cognition literature, groupthink is only one of many socially based cognitive biases that boardroom executives should fear.

In contrast to these grim accounts of collective action, there are of course much rosier depictions, often denoted the wisdom of crowds.[3] Unlike research into cognitive biases, this description of humans gives respect to the human brain's sometimes amazing feats of synthesis. The human brain is an

[1] Jen is a social scientist at Los Alamos National Laboratory where she works on the Collective Decision Making Systems project available at http://cdms.lanl.gov. This project investigates how the design of systems (especially those online) supports accurate and reliable decision making in groups.

[2] MacKay, C. (1980). *Extraordinary Popular Delusions and the Madness of Crowds*. New York: Harmony Books. (Original work published 1841).

[3] Refers to Surowiecki, J. (2004). *The Wisdom of Crowds*. New York: Doubleday.

unparalleled machine for tracking a vast number of subtle environmental cues to determine a future state. When occurring within a group, the evidence for these feats of insight are captured primarily in anecdotes as in the following:

> The IEM [Iowa Electronic Markets[4]] continued its track record of predicting election vote-share, predicting Bush's victory within 1.1 percent of the actual outcome. At midnight on Nov. 1, the IEM's vote share market had Bush earning 50.45 percent of the popular vote, compared to 49.55 percent for Kerry. The actual vote count as of Nov. 4 showed 51.54 percent for Bush and 48.55 percent for Kerry. [5]

So how can humans at once be totally biased, manipulable thinkers and wise, sophisticated problem-solvers? The answer exists in considering the system in which the problem is posed. It is the thinkers and their environment as a whole that work to hinder or support the production of the desired answer, whether that answer is a point of fact or a near supernatural prescience, as in the example above. For example, if we phrase a factual question as so:

Michigan, the state that was home to Henry Ford, the inventor of the automobile assembly line, remains today the home of major car manufacturers. What is the capital of Michigan?

One is likely to incorrectly name Detroit. By priming with details about Detroit, one is led away from the correct answer (Lansing is the capital of Michigan).

In this example, the priming leads to an incorrect answer but it could also be used to guide a person to the correct answer (what might be called a hint). In this case, it is the person plus the context that develops the correct answer. In a similar way, we can design systems that, when paired with a collective, create good decisions that the individuals would not have developed on their own. This system would structure both the embodied intelligence (from the physical environment) and the socially situated intelligence (from social interaction) to the extent necessary to create the desired outcome (i.e., a good decision).

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[4] Available at http://www.biz.uiowa.edu/iem

[5] McCrory, G. (2004, November 5). "Iowa Electronic Markets Forecasted Bush Win in Presidential Election." *University of Iowa News Service*. Retrieved November 9, 2007, from http://www.news-releases.uiowa.edu/2004/november/110504iem_wrap.html

Together, the collective and the system could be called a collectively intelligent system.

A collectively intelligent system need not be computer-based. For example, the Delphi method, whereby experts iteratively and anonymously contribute insight to work toward a combined collective view, is an asynchronous process that is often conducted through the mail. The system is collectively intelligent in that it avoids groupthink and the other cognitive biases that can occur in face-to-face discussions. The goal is to integrate the diversity of the collective, not to achieve consensus through the suppression of dissent.

While not all the systems are computer-based, the complementary strengths and weaknesses of humans and computers give computer-based systems a particular allure. The Internet has spawned numerous well-known applications that facilitate collectively intelligent systems. These systems include document rankings, folksonomies, recommender systems, vote systems, open source software, wikis, and prediction markets.[6] Each system offers a unique way to solve a problem or make a decision collectively. This requires two things of the system: a method to elicit the information from the appropriate individuals and method to aggregate that information so as to make it useful. The elegance of each system is in its ability to evoke the necessary answer. Whether intentional or evolutionary, the design of these systems allows them to exploit the power of the human mind to solve problems.

A collectively intelligent system can be placed into one of three categories based on the utilization of the collective:

1. **The collective is as smart as the smartest individual in the collective**

   This system type is exemplified by Innocentive.[7] Here a challenge in a corporation is opened up beyond the institution's walls by posting it to the Innocentive site. Anyone can access the site and choose to work on the problem. The corporation

[6] For an in-depth review of all seven system types see Watkins, J. H. & Rodriguez, M. A. (August 2007). A survey of web-based collective decision making systems. *Human Complex Systems. Lake Arrowhead Conference, 2007*. Paper JHW2007-1. http://repositories.cdlib.org/hcs/WorkingPapers2/JHW2007-1

[7] Available at http://www.innocentive.com.

compensates the one who most satisfactorily solves the problem. Here, the purpose of the collective is to provide the diversity out of which the smartest person for the particular problem can self-select. In other words, the collective is needed if the expert has not been identified, or changes from problem to problem.

2. **The collective is as smart as the sum of the individuals in the collective**[8]

   The Iowa Electronic Markets are a good example of this phenomenon. In these prediction markets, every participant alters the decision of the whole through the buying and selling of stocks. The price at which the stocks are traded can be interpreted as the likelihood (a probability) the collective attributes to the event occurring. Like traditional markets, the "invisible hand" governs prediction markets. This metaphor refers essentially a feedback mechanism that urges the contribution of the best information simultaneous to its aggregation. The result is potentially astounding prescience.

3. **The collective is smarter than sum of the individuals in the collective**

   This elusive category refers to decisions that transcend the combined intelligence of the collective to produce synergistic intelligence. Here the combined contributions of the collective provide a product that is more valuable than the contributions themselves. It is this use of collectively intelligent systems that represents the greatest boon to mankind.

In sum, my vision for collective intelligence is the refinement of collectively intelligent systems design such that even the most complex problems will yield to the efforts of the collective.

[8] For more examples of the first two categories, see Sunstein, C. R. (2006). *Infotopia: How many minds produce knowledge*. Oxford: Oxford University Press.

A contrarian view

Jaron Lanier [1]

My views are different from those of the other people commonly associated with the collective intelligence movement and its varied threads. I observe that meta-human or crowd wisdom processes can be effective, and often essential, but they are also "evil" in the sense that they destroy individual people, cultures, species, or other things that for whatever reason are outside of the boundaries of whatever the crowd process is optimizing for at the moment.

A crowd is a blunt instrument, not a delicate one. For example, the free market is effective, essential, the only proven means to wealth and continuous innovation; All that is true, and yet it also produces victims. It is sometimes cruel, generally impersonal and cold, and often dehumanizing, even to the winners in the system. The good it does is greater than the harm it causes, however, and therefore I am, overall, committed to capitalism.

An even more severe example is natural evolution, the ultimate group process. It is pure evil. Every little genetic feature of every living being is what's left over after failed, would-be ancestors were killed. Evolution is the aftermath of continuous genocide. Civilization's whole purpose is to stop it, and that is the very heart of kindness.

Yet, there is a certain romanticism among some smart, idealistic people, a desire to see nature as the good guy and civilization as the bad guy. As with capitalism, the truth is more complicated. The new romanticism for crowd wisdom seems similarly ill-informed to me. We should be honest about the

[1] Jaron Lanier is a computer scientist, composer, visual artist, and author. His current positions include Interdisciplinary Scholar-in-Residence, CET, UC Berkeley, and columnist for *Discover Magazine*. Lanier's interests include biomimetic information architectures, user interfaces, heterogeneous scientific simulations, advanced information systems for medicine, and computational approaches to the fundamentals of physics. A biographic summary is provided on the third page, in part because we wish to emphasize the depth of accomplishments to the lone contrarian.

inherent cruelty in some of the existing processes that we depend on in order to find little ways to improve things, and that should lead us to be cautious about new meta-human schemes that are supposed to be purely good.

I think the balance of good versus harm is different for different collective action schemes. Some of the political ones—more direct democracy, for instance—seem to empower extremists and bring out mob behavior. In general I think they're failures.

Meanwhile, some of the intellectual ones like the Wikipedia tend to be overly conservative in terms of content and to reduce innovative thought while being all too frequently bogged down in editing wars and some active online vandalism.[2]

I hope there are going to be new structures or instances of crowd wisdom that share with capitalism the quality that the benefits outweigh the harm, but I expect them to be rare.

I am concerned that the movement of idealistic people seeking more crowd effects is misguided. It reminds me of some of the Leftist movements of the past in which people were sure the right system would lead to a kind of automatic improvement in the human condition. That's not how reality works.

[2] As everyone knows, I'm appalled that people are being primarily directed by search engines to bland Wikipedia articles instead of websites by individuals that express individual points of view.

Additional Biographic Information

Lanier's name is also often associated with Virtual Reality research. He coined the term 'Virtual Reality' and in the early 1980s founded VPL Research, the first company to sell VR products. In the late 1980s he lead the team that developed the first implementations of multi-person virtual worlds using head mounted displays, for both local and wide area networks, as well as the first "avatars," or representations of users within such systems. While at VPL, he and his colleagues developed the first implementations of virtual reality applications in surgical simulation, vehicle interior prototyping, virtual sets for television production, and assorted other areas. Sun Microsystems acquired VPL's seminal portfolio of patents related to Virtual Reality and networked 3D graphics in 1999.

From 1997 to 2001, Lanier was the Chief Scientist of the Engineering Office of Internet2, and served as the Lead Scientist of the National Tele-immersion Initiative, a coalition of research universities studying advanced applications for Internet2. From 1998 to 2002 he was the Chief Scientist of Eyematic Interfaces, a machine vision company later acquired by Google. From 2007 to the present he has been the Scholar at Large for Microsoft's Live Labs. He is also the science advisor to Linden Lab, maker of Second Life. Lanier received an honorary doctorate from New Jersey Institute of Technology in 2006, was the recipient of CMU's Watson award in 2001, and was a finalist for the first Edge of Computation Award in 2005 in the world by *Prospect* and *Foreign Policy* magazines. The nation of Palau has issued a postage stamp in his honor. He helped make up the gadgets and scenarios for the 2002 science fiction movie *Minority Report* by Steven Spielberg. Various television documentaries have been produced about him, such as "Dreadlocks and Digital Dreamworlds" by *Tech TV* in 2002. The 1992 movie *Lawnmower Man* was in part based on him and his early laboratory. He was played by Piers Brosnan. He has appeared on national television many times, on shows such as "The News Hour," "Nightline," and "Charlie Rose," and has been profiled multiple times on the front pages of the *Wall Street Journal* and the *New York Times*.

His home page is http://www.jaronlanier.com. Also on Wikipedia.

Interview with Professor Pierre Lévy[1]

George Pór [2]

Semantic inter-operability: a condition for large-scale CI

George Pór: One of the things that inspired me to invite you to this conversation was knowing that whatever comes out of it will probably have the potential to trigger further interesting conversations in other circles of CI thinkers, doers, practitioners.

Pierre Lévy: OK.

GP: I kept following your work since our last conversation, a few years ago, and have been impressed by the journey you've been on. Your focus on making your CI model grounded in, supported by, and supporting, a robust computational semantics, is both evolutionary and revolutionary.

PL: I'm not so sure so many people think like you.

GP: I mean, if we can't destroy the barriers to semantic interoperability, we won't realize global CI... We may have a global brain but not a global mind, let alone global CI.

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[1] Professor Lévy is Canada Research Chair in Collective Intelligence at the University of Ottawa. The interview took place 12 January 2007 and was shortened somewhat and also updated by Professor Lévy on 10 November 2007. Transcription: Ms. Sheri Herndon.

[2] George Pór is an advisor to leaders in international business and government. Former Senior Research Fellow at INSEAD, currently he is a PrimaVera Research Fellow in Collective Intelligence at Universiteit van Amsterdam
http://primavera.feb.uva.nl/index.php?option=com_content&task=view&id=20
Publisher of the Blog of Collective Intelligence:
http://www.community-intelligence.com/blogs/public . His clients include: British Petroleum, EDS, Ericsson, European Commission, European Foundation for Management Development, European Investment Bank, Ford Motor Co., Hewlett Packard, Intel, Siemens, Sun Microsystems, Swiss Re, and Unilever. He can be reached at George(at)Community-Intelligence.com.

PL: That's exactly what I think.

GP: And what I appreciate a lot is that you not only think of, but also are pioneering an important piece of it, what you call the "information economy markup language."

PL: Actually, I call it "Information Economy Meta Language" (IEML).

GP: Oh, that's something new. I remember when you talked about CIML, the Collective Intelligence Mark-up Language, at the first CI Colloquium in Ottawa.

PL: The "ML" is a kind of veiled reference to "mark-up language" but it really means "meta language."

GP: Can you give us a picture of the world where the "semantic interoperability" challenges to CI are resolved with the help of your information economy meta-language?

PL: The problems of semantic operability are rather simple and clear. There are many natural languages and there are no simple and reliable means of automatic translation. This is the first point. The second is that we have many cataloguing systems, taxonomies, ontologies, and so on, and they are not compatible. In addition, the great majority of them were designed before the computer, like those that are employed by librarians. So they are not designed to exploit the new computing capabilities and the very important fact that in the near future, all the documents will be digitized and on line.

Finally there is this problem in computer science itself or in AI. Let's acknowledge that the original research program of AI has not succeeded. If we think at the scale of the Internet or at the scale of global human CI itself, it is rather obvious that, currently, there is no solution to the problem of processing the *meaning* of this huge amount of interdependent digitized information flow.

Why is no artificial intelligence environment up to this task? Because the computer scientists who tried to work in this direction thought they could encompass human intelligence by logic. But there is much more to human intelligence than logic. This should have been obvious from the beginning, but apparently it was not the case and we (I mean the scientific community) had to go through a process of trial and error.

The missing symbolic meta-language

We have a kind of global brain and we have a general interconnection, at least a *possible* general interconnection between all the computers and digital repositories of the planet: a global digital memory in the process of technical interconnection.

All the documents can be connected by hyperlinks and all the people that are behind the computers can exchange information. But there is no common language, no common *symbolic system* that can convey human meaning, on one side, and be computable by the symbolic automata that are today at our disposal, on the other side. We have to explore new possibilities.

Today, we have a huge opportunity to expand our personal and collective intelligence. But cultural tradition did not pass on to us any computable symbolic system able to map an infinite semantic space.

The reason why we *now* have to invent such a symbolic system is that the situation of having a global human digital memory animated by powerful symbolic automata, and accessible from anywhere in real time, is completely new—less than a generation!

This new environment offers us a fantastic opportunity to grow a better collective intelligence, from the scale of small teams to the scale of the human race, but there will be no big leap or significant threshold in collective cognition capabilities without reflexive power. If we, as homo sapiens, have a reflexive consciousness, it's not because we have big brains. Elephants have - and Neanderthal had - bigger brains. It's because we have this extraordinary inborn cognitive tool called "language" allowing us to add reflexivity to our minds…

By contrast, the other animal species have no language capabilities. Of course they have cognition and communication, but no reflexive consciousness, and consequently no (or very limited) cultural evolution.

Our current challenge is to get a reflexive consciousness at the scale of human collective intelligence. The kind of cyberspace-supported symbolic system that my CI Lab is currently working on aims at progressively developing a better consciousness of our collective intelligence and at supplying sophisticated maps and compasses to navigate our cultural evolution. Pursuing this goal,

there will of course be more "tangible" outcomes, like semantic search engines and powerful methodologies for knowledge management.

I'm not sure that my IEML will be *the* symbolic system of CI, but if we don't try, and experiment, and engage ourselves in seeking solutions for the "reflexive CI consciousness" problem, we will never solve it. So we have to *do* something. And I'm in a privileged situation by being supported by academic institutions funding this work and providing the proper environment for me and my team (the University of Ottawa, the Canada Research Chair program of the Canadian federal government, the SSHRC [Social Sciences and Humanities Research Council]).

I said that IEML is a symbolic system that is able, in principle, to express any meaning that can be expressed in natural languages, on one side, and that this meaning can be recognized and processed automatically, on the other side. The trick behind this is, in fact, very simple. Computers can only process syntax and they have no access to semantics. So, I had to design a language the semantic of which would be, as much as possible, parallel, or isomorphic, to its syntax. It is probably impossible to get a language the semantics of which is *completely* and *perfectly* expressed by its syntax (except in mathematics where we are limited to numbers and logics), but we can do a much better correspondence between syntax and semantics than in natural languages. This is what IEML is about: improving the computability of meaning.

Now, the grammar of the language has been completely formalized. Every expression of the meta-language can be recognized, parsed and processed by a deterministic finite machine (practically: by a computer program). The grammar will be published soon, with an open source parser. IEML expressions can express any complex concept or describe any complex network. I think that we have here a strong mathematical foundation (formal languages, set theory and graph theory) allowing automatic processing. I'm currently working on a theory of semantic functions—semantic transformations, perception of semantic patterns, automatic ranking on semantic criteria, etc.

Ultimately we'll have tools to model and simulate cognitive, social and cultural auto-poetic systems and interdependent ecosystems.

The Information Economy Meta Language in practice

That was the theory; now, the practical part. The language currently has only 2,000 words. It can accept something like 250 million words,10^{23} different

phrases and 10^{69} semes (that are triples of phrases). And if you want, you can arrange these semes in an open-ended complexity of graphs. It is practically infinite.

What we have to do now, with my very small team, is to take some terminologies, ontologies, and classification systems and translate them into IEML.

GP: That's exactly what I was going to ask about. You wrote somewhere that the multiplicity of ontologies and taxonomies is a challenge to the inter-operability of meaning. What would you reply, if a devil's advocate would ask, isn't IEML just adding to that multiplicity of ontologies and taxonomies?

PL: What I plan to do in the coming years is to take some ontologies from interesting fields, like public health, professional skills, e-commerce, etc., and to translate them into IEML so that we can build semantic search engines that can process the documents indexed in IEML even if they were indexed originally by different ontologies of separate fields.

I'm adding a new meta-layer, where documents indexed in the context of different ontologies can be searched by a semantic search engine that can work on a heterogeneous corpus. I would like to show that, in addition to translating different ontologies into the same meta-language, we can perform a much more precise, rigorous—a much more scientific—search than we can with current search engines—even with documents that were originally indexed by incompatible ontologies—provided that these ontologies have been translated in IEML.

All the work that has been done in any ontology can be "saved" and valued in a kind of universal level, in IEML, so the work of ontology builders is not lost.

GP: And powered up because IEML will make them capable of traveling further and faster, in connecting with ontologies of other fields, supported by a mathematically formalized language.

People who work on the project

Pierre, you said something about your "small team" which reminded me that now that you've laid strong foundations, could your work at this stage benefit if there was a way to amplify the circle of people involved with it? In other words, would it be useful to engage more minds helping you further develop the dictionary and the methods in various other domains?

PL: I'm not sure. You were involved with the CI Lab when I tried to gather a network of people interested in building this new field of CI, but I realized that at least from my perspective, it was too early. And for the last past 4 years I have been working almost alone. Now for the three years to come, I will not be alone because the tasks to be done need the skills of a team of good computer scientists, but it will be a small team, a little group in Brazil, France, Canada, and two or three experts in the U.S. In a way, that is already complex enough, because all those people will have to build a common computing environment.

And on the other hand I have to work with specialists of public health and various other fields, like food industry, professional skills, etc., to translate their terminologies in IEML—not more than three to four, or maximum five different fields. And then we have to provide the empirical proof that it works, *demonstrating* that it works, that we have made a scientific leap in semantic search and knowledge management based on computational semantics.

This will take probably two to three years, maybe four years. In this process we will have discovered many problems and tried to solve them, we will have developed a methodology of IEML translation, and tested the computing and semantic search tools. When this phase of R&D has been completed, of course it will be time to open the circle.

But nevertheless since April 2007, on the website of the Lab, http://www.ieml.org, there is a *wikimetal*, for "wiki meta language." This wiki will support collaborative work on the translation of the various terminologies into IEML. Today there are 2000 words. But at the end of these three years of collaborative work, there will be at least—let's say 15,000 words. We will gain experience in the processes of collaborative translation of various terminologies into IEML. Today the IEML words are interpreted only in French and English. At the end they will be interpreted in Spanish, Portuguese, and maybe in some Asian languages. Once we have a strong empirical scientific foundation, when we have proven that the theory is not invalidated by a large-scale experience, IEML will be able to "walk by itself."

Computational semantics and the wisdom traditions

GP: The whole idea of CI Convergence is to make the important work of the various tribes of CI more visible to one another, and CI based on computational semantics is an essential field within the larger field.

PL: A kind of sub-discipline of CI.

GP: Yes, and it can enrich the other perspectives on CI. It can also inspire us to ask, just what are all the interesting things that we can think of when we think of CI as a field of multidisciplinary study and practice? That's one of the reasons why I would like to find ways to make your contribution to the field more visible to our colleagues. That's why I am looking for easy points of access to it by "lay people," I mean, colleagues who are not specialists in your domain. Looking at the "resource flow" diagram is a small and easy step in discovering what you do; it can also trigger interest in understanding more of it, as it did for me.

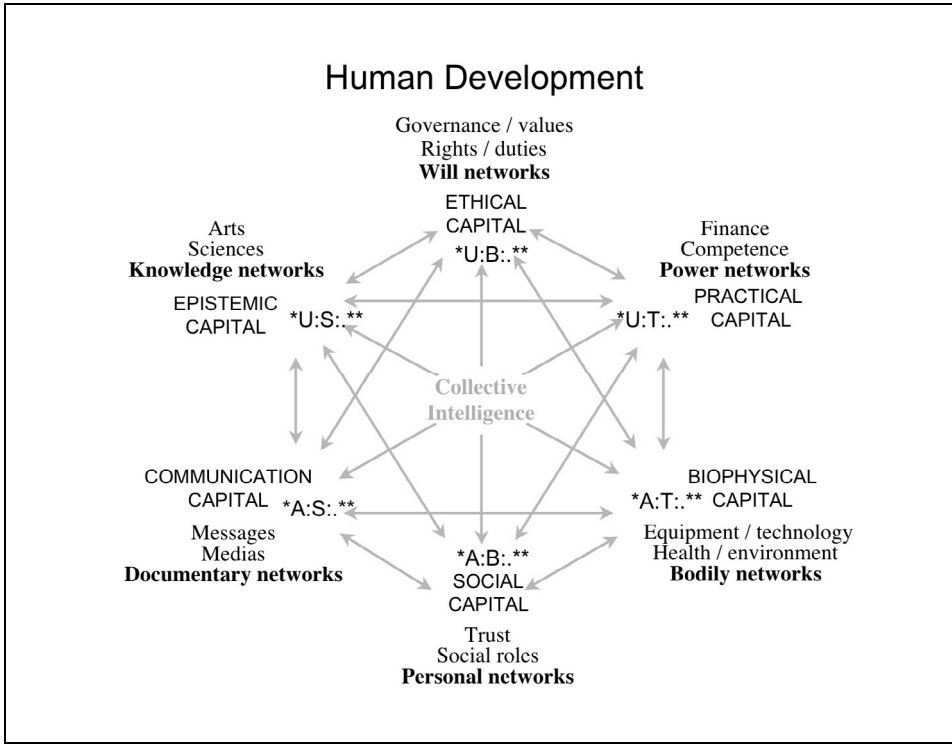

Figure 1: The Six-Pole Resource Flow Diagram

PL: In the six pole diagram above, A: means “actual", U: means “virtual", S: means “sign", B: means “being” and T: means “thing". This notion of symbolic meta-language that can encompass any aspect of human life can be found, for example, in the Chinese tradition of the *I Ching*, where the basic human situations and their dynamic tensions are represented by a purely combinatorial system. It can be found in the Jewish tradition—just think of the Kabala and its manipulation and combinations of letters having multiple layers of interpretation. It can be found in some Buddhist and Tantric traditions, if you think about the Kalachakra tradition, for example, where there are very complex mandalas with hundreds of deities and symbols and all around a complex organized space with at least 3 different levels of interpretation. We can also think about the very rich tradition of the western “arts of memory” that were included in the rhetorical disciplines. All these traditions have developed a kind of symbolic geometry, or a geometry of meaningful symbols. My work connects not only horizontally, at this present time, as an effort to augment human CI with the intellectual, scientific and technical tools we have today, but it is also, in a kind of vertical time dimension, the continuation of a very ancient effort of various traditions. It strikes me that the quest for an all encompassing symbolic system that tries to overcome the limitations of natural language by geometrizing or mathematizing the signification process is something that can be found in so many traditions, including the good old Western philosophic and scientific tradition. Think of the work of Leibniz for example, his universal characteristics, or even Peirce’s attempts.

So there are some deep roots… it’s not only “let’s improve the semantic web.” It’s more than that; just to add some dimension.

Why the semantic web is not enough

GP: Yes, I can see that. Regarding our contemporaries, whom do you think of as a leading light in computational semantics, today, or in any area that inspired your work?

PL: Of course the first name that comes to my mind is Doug Engelbart. He was one of the first to understand that what we had to do with computers was not “artificial intelligence” but augmentation of personal and collective intelligence. He is also one of the few to recognize that this cognitive augmentation is connected to adding sophistication to our symbolic tools. We owe him the first versions of the mouse, and many of our first hypertext and

groupware tools. I read also with pleasure the works of John Sowa on ontology and knowledge representation.

I have a great admiration for Tim Berners-Lee because he connected the field of hypertext and the field of computer networks. The result was the invention of the web, a new layer for the addressing of digital memory: addressing the pages. And this allows us to send a link for such-and-such a page in our e-mails, and to navigate from any page towards any other page, at the scale of the Internet. This was a huge achievement.

Finally, since several years now, I have a great intellectual exchange with Michel Biezunski and Steve Newcomb who were the inventors of the "topic maps" a very powerful norm for hypertextual information architecture.

GP: How will the next stage of digital memory addressing differ from the semantic web that Tim Berners-Lee is championing?

PL: If you look at the current tools of the semantic web—XML, RDF, OWL—basically they are *logical* tools and not *semantic* tools. XML explicates the logical structure of a database, RDF is an attempt to perform a kind of cataloguing of Web resources by triples that can be connected in graphs. And OWL is just a language to formalize and process ontologies, but the different incompatible ontologies stay different and incompatible. Also, what you have inside the angle brackets "< >" in XML, RDF or OWL is still natural language expressions, with all their inherent limitations.

I really think that what we need now is to design a symbolic system that resonates with the scale, complexity and power of our new technical environment and I don't see this theoretical boldness in the current work of the semantic Web, even if what is being done here is obviously very useful.

I'm not sure at all if this new symbolic system will be IEML but I think we do need this kind of symbolic system. Maybe it's a matter of several generations.

GP: In any case, you are prototyping the first one, and you make the importance of the whole issue more visible and more ready to be looked at from various perspectives. (The one from which I'm looking at it, is the evolution of collective consciousness at increasing scale.)

PL: It would be nice if, in the CI field, people would begin to consider that there is not only a universal, infinite, and measurable *physical* space, but also a universal, infinite, and measurable *semantic* space, and that we could observe,

understand and improve the processes in this semantic space. We have the hardware aspect of the observation instrument [i.e., linked computers to observe this semantic space, like telescopes or microscopes to observe physical space].

Now we need the software and symbolic part of it to make this observation instrument fully operational. So there is a whole new space that we can collectively explore and understand more… If I could bring people into looking at this space, it would be enough. It would be an achievement.

Setting the stage for beginning an exchange…

GP: That's very inspiring. You know, even before you build up the 15,000-word meta-language, and even before you develop your first prototype, your ideas are already inspiring some of us to see a new dimension of the CI field, which I and probably a number of us didn't think of before hearing about your work.

PL: I appreciate very much the work that you are doing in the convergence of people working in this field. I wanted to do it myself but realized it was not my "karma" to do it. But it has to be done. I also sent an email to Thomas Malone the director of CI center at MIT and he answered very gently. I think that it is a good thing that MIT opened such a research center with such a title. It is a kind of signal, it is no longer a marginal field, it is mainstream. It is good news.

GP: For me, your getting the *Canada Research Chair on CI* was already a significant step in the direction of CI being recognized. Thinking of the many different ways that different colleagues are approaching it, I just can't prevent myself from fantasizing about a "what if": What if we are at a stage in our work where we've already laid the groundwork and, of course, there is still much more to do, but we do experience more freedom and curiosity in ourselves to look around and see who else is here on this field and what we can gift one another with. That's the dream that I hold when I'm sensing into what the Collective Intelligence Convergence can become. That's one of the possibilities that I feel attracted to.

Relevant link

Collective Intelligence Lab: http://www.ieml.org/

Harnessing the collective intelligence of the World-Wide Web

Nova Spivack[1]

Introduction

We are about to enter the third decade of the Web, sometimes referred to as "Web 3.0." During this decade, the Web will evolve from a globally distributed fileserver into a globally distributed database. This shift will be enabled by a set of emerging technologies called The Semantic Web, which add a new layer of machine-understandable metadata about the meaning of information to the content of the Web.

The Semantic Web will catalyze a new era in collective intelligence. Individuals, groups, organizations and communities will be able to create, connect, find and share knowledge more intelligently and productively than ever before. Ultimately it will enable the Web itself, and all the people and applications that participate in it, to become more collectively intelligent.

Web 3.0—The Third Decade of the Web

The third-decade of the Web, "Web 3.0," begins officially in 2010, but we are already entering the early stages of this transition today. To understand where the Web is headed it helps to zoom out to a larger historical context.

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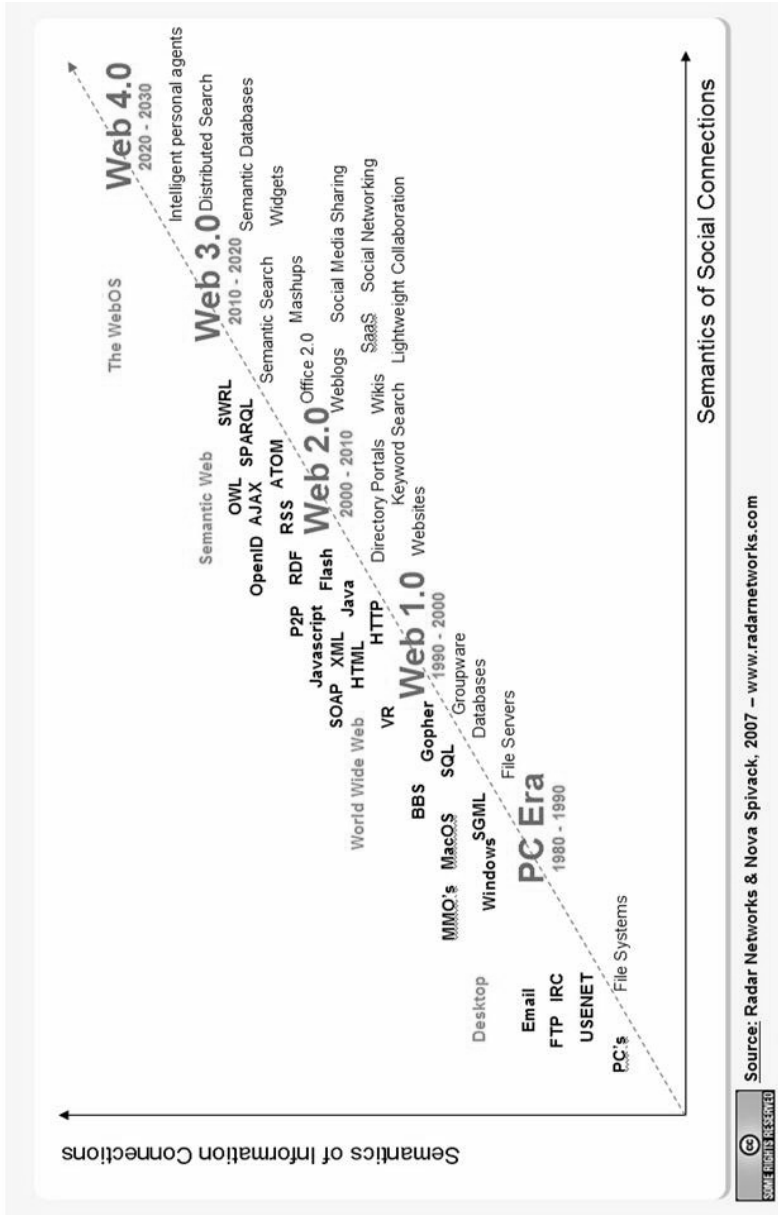

Figure 1: The Decades of the Web

The final decade of the PC-era (1980—1990) was largely concerned with innovation on the front-end of the personal computer: the desktop and user interface layer of the PC. The focus of this period was in making PC's easier to use with innovations such as Microsoft Windows, the Macintosh user-interface, and more consistent user-interfaces and integration across applications.

The first decade of the Web-era ("Web 1.0" from 1990 - 2000), was focused on the back-end of the Web: the core technologies and platforms of the Web such as HTML, HTTP, Web servers, search engines, commerce technologies, advertising technologies, and the basic architectures and business model of Web applications. This decade was mainly focused on the technology and infrastructure of the Web and most of the actual innovation dollars were spent on making things that only software developers could see.

In contrast, the second decade of the Web ("Web 2.0" from 2000—2010) has been largely focused on the front-end of the Web. Much of the innovation has not been on actual technology but rather on design patterns and user-interfaces for improving the end-user experience of the Web. During this decade we have focused on paradigms such as AJAX, which is a set of technologies and design methodologies for making Web sites more visually appealing and interactive.

Another big focus of Web 2.0 has been user-generated content, and in particular the practice of "tagging" content with subject tags. Tagging has in turn led to the concept of "folksonomies" in which taxonomies that organize data are evolved in a bottom-up fashion by a decentralized community of users.

The coming third-decade of the Web ("Web 3.0" from 2010—2020) will shift the emphasis back to the back-end of the Web. This decade will be largely focused on upgrading the technical infrastructure and content of the Web, based on emerging technologies such as the Semantic Web. During this decade the primary push will be enriching the Web so that it can function more like a database.

Today the Web is composed mainly of unstructured and semistructured data such as text files and Web pages. Keyword search engines are able to provide rudimentary search capabilities over this information, but only for the most simplistic queries. Compare current Web search to the more precise capabilities of queries against a database and the difference is immediately

clear. The Web does not provide anything close to the search capabilities or precision of a database today. But that is about to change.

The Semantic Web provides a way to enrich both unstructured and structured data so that it can be queried with the precision of a database. Essentially, it provides a way to tag any information with metadata that explains what it means—and this metadata can be understood by software applications, such as search engines or knowledge management applications. It's important to note that The Semantic Web is not a new Web, it's just a new layer of the Web we already have. The semantic metadata that comprises the knowledge of the Semantic Web won't live in some new place—it lives right in the existing documents and data on the Web. The knowledge of the Semantic Web is encoded using special new markup languages such as RDF and OWL.

This metadata is invisible to users (it doesn't appear in Web browsers) but behind the scenes it can be read by any application that is compatible with these markup languages. So when any application, such as a next-generation search engine, sees a Web page or data record that contains RDF or OWL metadata, it can then use that metadata to understand what that page or data record means, is about, what it is related to, and how to interpret it. With Semantic Web metadata in place, searches on the Web will be as, or even more, precise as those in any database. But that is just the beginning of what the Semantic Web enables. Beyond merely improving search, the Semantic Web actually transforms the Web into a database—a worldwide database in which data records can be moved around, shared, and linked together in new ways.

On the basis of the technologies of The Semantic Web and the Web 3.0 era, we will then be able to enter the fourth decade of the Web ("Web 4.0"—2020—2030) in which the shift will turn back to the front-end of the Web. The Semantic Web doesn't just add metadata about the meaning of information to the Web, it also enables metadata to be added about relationships, conceptual linkages, logical connections, and even logical rules. On the basis of this additional metadata, Web users and other applications will be able to harness the power of intelligent agents that will search the Web for things that interest them, make suggestions and recommendations, and even potentially transact on their behalf. This will open the door to a new kind of user-interface to the Web that is smarter and more conversational in nature, in which users will enter into dialogues with agents and interact with them search the Web and make decisions. A conversational interface to the Web will be more appropriate in the

increasingly mobile world, when users will mostly interact with the Web from small portable mobile or embedded devices.

Users on mobile devices that have little to no screen real-estate will need a more productive way to interact with the Web than through a miniature browser; nobody likes sorting through pages of Google results on a cell phone. Instead, they will want to simply ask a question (perhaps through a voice interface, rather than typing with their thumbs) and have a virtual intelligent assistant dispatch agents to find the best answers and then report back to them with results or to ask further questions or for a decision.

Smart, interactive conversational interfaces and intelligent agent-based virtual assistants are possible today, but only in narrow domains. In the Web 4.0 era they may in fact be our primary way of interacting with the whole Web and may be built into the user interface of most search engines, personal email providers, and leading Websites.

The Virtualization of Knowledge and Intelligence

In the long-term, the Semantic Web provides a way to move much of the "intelligence" that currently resides in the minds of individuals, groups and organizations, and/or that is hard-coded into various software and Web applications, out onto the Web itself. It provides a way to virtualize knowledge and intelligence in an explicitly machine-readable, universally accessible form. In other words, it provides a way to start making the Web "smarter."

Knowledge and expertise that previously only existed in people's heads, or had to be painstakingly coded into each particular vertical software application, will be represented in a form of universally readable metadata on the Web—just like HTML documents today. In other words, using the Semantic Web you can publish knowledge and even the underlying conceptual frameworks, rules and heuristics that embody domain expertise, on the Web in an abstract, machine-readable form.

There are many benefits that stem from this. For one thing, it will make it much easier to write smart software applications because much of the necessary "smarts" will not reside in the applications at all, but will rather live out there on the Web.

For example, to write an application that can intelligently assist with travel logistics, a developer will simply be able to point it at existing sets of

knowledge and rules that exist for the travel domain on the Web already. The application will be able to draw on those pools of existing domain-knowledge without having to be specifically programmed to do so, because it understands the underlying standards of the Semantic Web. Similarly, the same application could just as easily help someone trade on the stock market, by simply pointing to domain knowledge on Semantic Web about finance and investment.

As more pools of domain knowledge are added to the Web around various verticals, all applications will potentially benefit. This sets up a kind of network effect in which a global knowledge commons begins to form and self-amplify over time. For example, first the travel domain is added to the Semantic Web. Then someone else adds domain knowledge about geography and links them together. Another group then adds domain knowledge about hotels, and another one adds domain knowledge about weather—and these all connect to each other in various ways.

With all of this interconnected knowledge on the Web in machine-readable form, application developers can then more easily and quickly write applications that understand concepts and rules related to booking travel reservations, and that can cross-reference reservation information with knowledge about geographic places, relevant weather, and hotels in those locations. And in the other direction, someone booking a hotel can then find information about relevant weather and book travel to get to that hotel. This is just one example. There are an infinite range of other possibilities for these technologies across all domains.

The key point of all this is that The Semantic Web enables applications to become thinner, yet at the same time smarter, by drawing on the collective intelligence embodied by the Web itself. It will become possible to write applications that understand one or more specialized vertical domains faster, and ultimately applications will become more general—they will be able to dynamically load in specialized domain knowledge for whatever domain is needed, without having to be specifically programmed or limited to just those domains.

Application developers will be able to draw on the knowledge added to the Web by others, instead of having to reinvent the wheel by programming all that knowledge directly into their applications every time. And in turn, the knowledge that their applications create can, if they want to allow it, be published back onto the Web for other applications to draw on as well.

Semantic Web as The Next Leap in Human Collective Intelligence

Looking at the evolution of the Semantic Web in historical context, we can view it as the next big step in a longer process of the evolution of human collective intelligence.

Before the invention of written language, knowledge could only be communicated verbally and was handed down through oral traditions. During this period, one had to be in immediate physical proximity of someone who had certain knowledge in order to receive it from them. This meant that the maximum effective range of human collective intelligence was quite short in space and time.

With the invention of writing, and eventually printing, humanity was able to process knowledge over longer distances in space and time, and with less reliance on particular individuals. People could now engage in dialogues and dialectics with larger groups of people in more places, across larger distances in space, and with more precision over larger ranges of time.

The printing press took this to a new level by starting the process of mass-distribution of knowledge, but it still relied on an expensive physical manufacturing process and a paper medium that was perishable and costly to store and move around.

With advent of electronic communications of various forms, humanity achieved many milestones—the transmission of knowledge could take place at the speed of light, and using digital storage media we were freed from the limitations of the paper medium.

The Internet and the Web transformed the process of distributing knowledge even further—enabling a global knowledge commons to emerge. The Internet and Web enable anyone and everyone to become providers of knowledge, not just consumers—a fundamental shift in the way that knowledge transmission and media function. They are not just about the mass-distribution and mass-consumption of knowledge; they enable the mass-creation of knowledge. In some respects these technologies are analogues of the printing press in that they have democratized the process of creating, sharing and accessing knowledge by fundamentally changing the economics of the entire process—making it affordable and accessible to all.

But even on the Web, for all its many benefits, knowledge is still not free from the limitations of the human brain. Only humans can really understand the knowledge that is represented in Web sites and databases, for example. While all other processes related to the distribution, storage and access to knowledge can now be done digitally, using software and the Web, the processes of creating, consuming and actually understanding knowledge are still limited only to living humans. That's where the Semantic Web comes in.

Liberating Knowledge and Intelligence from Human Brains

The Semantic Web virtualizes human knowledge and expertise outside of human brains, and even outside of any particular software application—knowledge becomes essentially just more data on the Web. When we speak of knowledge here we don't just mean information—the first-order raw data that is currently on the Web—we mean the actual meaning and interpretation of the information that is not on the Web but rather exists only in human brains.

The Semantic Web provides a way to make the meaning and interpretation of information explicit in a form that is unambiguous and publishable, and shareable, on the Web. This will make all this knowledge understandable by software. It's almost like the invention of a new language—a sort of meta-language for formally expressing what exactly you mean when you say something. The impact of this could be enormous.

For the first time in human history, we won't have to rely only on humans to create, understand and consume knowledge—our machines will be able to help us do this. They will help us work, collaborate, create, explore, monitor, discover, search, innovate, connect, and synthesize. This will open the door to an almost unimaginable amplification of the human mind, and human collective intelligence on this planet. At first the impact of this will largely be focused around assisting humans with simple clerical and research tasks, but the process will inevitably continue to evolve to a point where software will begin to originate new knowledge for us, advise us, and eventually to even start making certain types of decisions on our behalf.

Although the Semantic Web has barely moved from the lab to the mainstream Internet, it is in fact much farther along than most people realize. Today there are already semantic applications under development that can organize all your information automatically, make recommendations based on your dynamically changing interests, identify new connections between ideas or

documents in different places, make logical inferences or discover contradictions, and even make discoveries by doing proofs and explorations based on available data.

Within a few years these capabilities will begin to filter out to the mainstream users of the Internet, and with a decade or two at most, they will become commonplace. There are only a few billion humans today, and each of us can only cope with a small amount of information and relationships before we become overloaded. But in an era of machine understanding of human knowledge we may potentially be able to leverage thousands to millions of software agents to help us. This will vastly increase our ability to cope with masses of information and relationships productively. In an increasingly complex, distributed, and rapidly changing world, we simply will not be able to cope in the future without help. The Semantic Web provides one path to solving these problems, enabling us to remain productive in the future.

Amplifying Human Collective Intelligence

The Semantic Web does not replace humans or take them out of the equation. It simply reduces the load on humans, freeing them from some of the pain of information overload, and providing a new path for software to begin to augment and even amplify human collective intelligence.

Today there are several barriers to human collective intelligence that arise from basic limitations of the human brain. Human individuals, and groups of humans, simply cannot process or share knowledge effectively beyond a certain level of information or relationship complexity and change. For this reason, collaboration and collective intelligence are often easier to achieve and yield better results in small groups than large groups.

As group size increases, productive collective intelligence becomes dramatically harder to achieve. Thus, ironically even though larger groups offer the potential for exponential increases in collective intelligence, in practice the opposite is usually the result: the larger teams get, the dumber they get. An entire industry of management consultants and facilitators exists because of these inefficiencies.

The Semantic Web may be able to help with this age-old problem. By enabling software to understand information and relationships, we may be able to begin to automatically and intelligently facilitate interpersonal and group

collaboration and knowledge management, and this may finally enable larger groups to become exponentially smarter instead of dumber.

Twine.com—A New Service for Collective Intelligence

My own company, Radar Networks, has recently introduced a new service based on the Semantic Web, called Twine (www.twine.com) that focuses on amplifying human collective intelligence. Twine helps individuals and groups manage and share knowledge more productively, using the Semantic Web.

As people use Twine it learns from them and automatically organizes and connects their information with other related information, saving them valuable time and enabling them to discover connected knowledge. Twine provides individuals and groups with a smart virtual environment for their knowledge.

Twine works with all kinds of knowledge—email, RSS, Web pages, documents, photos, videos, audio, contact records, or anything else. Regardless of where information actually resides, Twine enables users to view it as if it were in one place, and to see how it is connected and organized. Twine also automatically helps to make sense of information and to make it more easily searchable.

Twine is a Web-based online service that is completely built using the Semantic Web. Although it is only in early beta-testing at the time of this writing, it is already demonstrating that intelligent machine-augmentation of individual and group knowledge management is possible and improves productivity and collaboration.

As Twine unfolds and spreads to more individuals, groups and teams, and organizations and communities, it has the potential to become a new backbone for collective intelligence and knowledge sharing worldwide. At least that is the vision of the project. Time will tell whether we succeed it.

From Global Knowledge Commons to Global Brain

If the Semantic Web develops as predicted, it is possible that within 20 years much, if not all, human knowledge will be represented on the Web in machine-understandable form. We have seen the beginnings of this trend with services such as the Wikipedia. More recently, another initiative called the DBpedia is creating a Semantic Web version of the Wikipedia. But this is just the start of this trend.

As more and more applications and services start producing Semantic Web metadata and exposing it back to other applications and services on the Web, we will begin to create a new global knowledge commons. At first these different services will function like islands of knowledge, but then they will begin to interconnect.

A piece of knowledge in one place will link to and from pieces of knowledge in other places. Eventually this will become a giant associative network, not so unlike the brain, but on a global scale. And as people and applications surf through its connections and consume its knowledge, adding new knowledge and connections back to it as they do, it will change and self-organize dynamically. Just as the first generations of the Web have enabled a global medium for "hypertext," the Semantic Web will enable a global medium for "hyperdata."

As one projects the future evolution of the Web and the emerging Semantic Web, one cannot help but notice certain similarities to the human mind. Some have even ventured to call this the beginning of an emerging "Global Brain." It is too early to tell how similar it will truly be to the actual human brain. However we can already predict with confidence that it will a system that collectively will be capable of at least rudimentary learning, memory, perception, planning and reasoning.

The human brain is a massively parallel collective intelligence engine in which billions of neurons interact across trillions of connections to process and generate knowledge.

Similarly, the collective intelligence of the Web will involve the combined interactions and intelligence of billions of humans and machines across trillions of relationships. These processes will not be guided centrally, and the system will most likely not be centralized around a single construct of a "self" nor will it have anything like a human body.

While it will be possible to say the system as a whole is intelligent, it will be difficult to locate any particular source of that intelligence; the intelligence will come from everywhere: from the humans, the software and even the data and links that comprise the Web.

Because the Web is quite different from the human brain, it is likely that its intelligence will be different from what we think of as human intelligence today. But it will nonetheless be intelligent—in a massively distributed,

emergent, and chaotic way that we humans may not be able to even comprehend. The "thoughts" the Web will think may be just too vast and complex for us to even recognize, let alone imagine or understand. Yet perhaps in decade-long time-scales at least, we will begin to be able to see the outlines of its thinking.

The Emergence of a Global Brain

Francis Heylighen[1]

Introduction

There is little doubt that the most important technological, economic and social development of the past decades is the emergence of a global, computer-based communication network. This network has been growing at an explosive rate, affecting—directly or indirectly—ever more aspects of the daily lives of the people on this planet. A general trend is that the information network becomes ever more global, more encompassing, more tightly linked to the individuals and groups that use it, and more intelligent in the way it supports them. The web doesn't just passively provide information, it now also actively alerts and guides people to the best options for them personally, while stimulating them to share their experience. To support this, the web increasingly builds on the knowledge and intelligence of all its users collectively, thanks to technologies such as blogs, wikis, ontologies, collaborative filtering, software agents, and online markets. It appears as though the net is turning into a nervous system for humanity.

The "Global Brain" is a metaphor for this emerging, collectively intelligent network that is formed by the people of this planet together with the computers, knowledge bases, and communication links that connect them together. This network is an immensely complex, self-organizing system. It not only processes information, but increasingly can be seen to play the role of a brain: making

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[1] Francis Heylighen is a research professor at the Free University of Brussels (VUB), where he directs the Evolution, Complexity and Cognition group. His research is focused on the self-organization and evolution of complex, intelligent systems consisting of many interacting agents. He is editor of the Principia Cybernetica Project for the development of an evolutionary-systemic philosophy, and chair of the Global Brain group. He has published over a hundred scientific papers on these and related topics. Home page: http://pcp.vub.ac.be/HEYL.html

decisions, solving problems, learning new connections, and discovering new ideas. No individual, organization or computer is in control of this system: its knowledge and intelligence are distributed over all its components. They emerge from the collective interactions between all the human and machine subsystems. Such a system may be able to tackle current and emerging global problems that have eluded more traditional approaches. Yet, at the same time it will create new technological and social challenges that are still difficult to imagine.

History of the Global Brain vision

Although these developments seem very modern, the underlying visions of knowledge and society have deep roots, going back to Antiquity, and developed in particular during the 19th and 20th centuries. This concept of a cognitive system at the planetary level has been proposed by many different authors under different names: planetary brain, world brain, global mind, noosphere, social brain, Metaman [Stock, 1993], super-organism [Heylighen, 2007c], super-being [Turchin, 1977], and collective consciousness are some of the roughly equivalent synonyms. The evolutionary theologian Teilhard de Chardin [1969, first published 1947 but written earlier] was probably the first to focus on the mental organization of this social organism, which he called the "noosphere". Around the same time, the science fiction writer H. G. Wells [1938] proposed the concept of a "world brain" as a unified system of knowledge, accessible to all. The term "global brain" seems to have been first used by Russell [1995]. The first people to have made the connection between this concept and the emerging Internet may well be Mayer-Kress [1995] and de Rosnay [2000]. Heylighen and Bollen [1996], and Goertzel [2001] appear to be the first researchers to have proposed concrete technologies that might turn the Internet into an intelligent, brain-like network.

The global brain vision draws part of its inspiration from a number of related approaches. Collective intelligence [Lévy, 1997; Heylighen, 1999] is the idea that a group can be more intelligent than its members. The best-known examples are social insects, such as ants, termites or bees, which are individually dumb, but capable of surprisingly intelligent behavior when functioning as a group. The intelligence of the global brain will be collective, as it arises from the interactions between millions of individuals. Symbiotic intelligence is the idea that intelligence can also emerge from the interactions between essentially different components, such as people and computers. As de

Rosnay [2000] proposes, people will live in symbiosis with this surrounding network of technological systems, and out of this symbiosis, a higher-level intelligence will emerge.

Although most researchers have addressed the global brain idea from a scientific or technological point of view, authors like Teilhard de Chardin [1969] and Russell [1995] have explored some of its spiritual aspects. Similar to many mystical traditions, the global brain idea holds the promise of a much-enhanced level of consciousness and a state of deep synergy or union that encompasses humanity as a whole. Theists might view this state of holistic consciousness as a union with God. Humanists might see it as the creation, by humanity itself, of an entity with God-like powers. Followers of the Gaia hypothesis have suggested that the "living Earth" of which we are all part deserves awe and worship; it therefore could form the basis of a secular, ecologically inspired religion. The Global Brain vision may offer a similar sense of belonging to a larger whole and of an encompassing purpose.

The evolution of cooperation

While most conceptions of the Global Brain are based on some kind of progressive evolution towards higher levels of complexity and integration, this assumption receives surprisingly little support from the theory of evolution itself. The traditional (neo-)Darwinist theory emphasizes the gradual, erratic, and non-directed character of variation and natural selection, and the struggle for existence between selfish organisms or genes. It is only in the last decade that biologists have started to focus on the "major transitions" in evolution, such as the emergence of multicellular organisms out of single cells, or societies out of individuals—studying the specific circumstances in which components can turn from selfish, competing individuals to cooperating members of a collective. The general consensus seems to be that, while such transitions have happened, they are rare and difficult to achieve, because they require sophisticated control mechanisms to protect the cooperative from being exploited by "free riders", i.e. individuals that profit from the efforts of others without investing anything in return.

The new approach of *evolutionary cybernetics* [Heylighen, 2007b] integrates the Darwinian logic of variation and natural selection with the cybernetic analysis of emergent levels of organization. This approach originates with the ideas of the Russian-American computer scientist Turchin [1977].

Turchin's most important contribution is the concept of *metasystem transition*: the evolution of a higher level of control and cognition. In analogy with the emergence of multicellular organisms, Turchin predicted that humans would be integrated into a global *superbeing*, communicating through the direct connection of their nervous systems.

Turchin had not yet tackled the problem of free riders, though. Extending his theory, I have suggested a possible solution [Heylighen & Campbell, 1995], arguing that shared knowledge or culture ("memes") can function like a control mechanism to thwart free riders, and that its spread will be facilitated by global communication technology. A more general version of this process was proposed by the Australian social scientist John Stewart [2000]. He argues that any system, whether an individual, institution or ideology, that manages to take control of a collective—even if for initially selfish purposes—will eventually evolve into an efficient "manager" that keeps selfish abuses in check, because it is in its own interest to have the collective function synergetically. As a result, evolution produces ever wider and deeper synergy, up to the global level. A similar conclusion was reached by Robert Wright [2000], who examined the historical role of different technologies and institutions, such as writing, money and law, in turning the "zero-sum" competition between individuals into a "positive-sum" cooperation.

Unlike material resources, knowledge and information do not diminish by being shared with others (economists call this property "non-rivalry") [Heylighen, 2007a]. Since an intelligent web would make this sharing effortless and free, this enables a positive-sum interaction in which everyone gains by making their individual knowledge and experience available to others. This provides a continuing incentive for further cognitive integration. The web plays here the role of a shared memory, that collects, organizes and makes available collective wisdom [Heylighen, 1999]. It achieves this without demanding anything from its users or contributors beyond what they would have had to invest if they were working on their own—thus removing any incentive for free-riding. This is the perspective of *stigmergy*, i.e. the spontaneous, indirect collaboration made possible and stimulated by a shared medium [Heylighen, 2007a,c].

Stigmergy

The mechanism of stigmergy, which was proposed to explain the collective intelligence of social insects, is perhaps best exemplified by Wikipedia, the global electronic encyclopedia that is being written collaboratively by millions of people. Any user of the web can add to or edit the text of any Wikipedia article—or create a new one, if its subject is not covered yet. Yet, the collaboration between Wikipedia contributors is essentially *indirect*. Over its history of a few years a typical article has been edited by a few dozen different people from different parts of the globe. In general, these people have never met or even communicated from person to person. Their interaction is merely implicit, through the changes that the one makes to the text written by the other.

When they disagree about how to express a particular subject, the one may repeatedly correct the statements written by the other and vice versa, until perhaps a compromise or synthesis emerges—which may have been proposed by one or more third parties. This is variation and selection at work: different people contribute different text fragments, some of which are clear, accurate and relevant, some of which are less so. The continuing process of revisioning by a variety of users will normally leave the good contributions in place, and get rid of the poor ones, until the text as a whole provides a clear, coherent and in-depth coverage of its subject, without glaring mistakes.

This example shows the power of stigmergy: thanks to the availability of the medium (in this case the Wikipedia website) independent agents together perform a complex activity that is beneficial to all, minimizing social frictions and stimulating synergy—and this without need for a hierarchical control or coordination, a clear plan, or even any direct communication between the agents [Heylighen, 2007c]. In the present web, similar mechanisms are being used to collaboratively develop not just an encyclopedia of existing knowledge, but a variety of novel knowledge and applications, including various types of open source software, scientific papers, and even forecasts of the world to come. In the future web, stigmergy can be extended from a qualitative mechanism (eliciting new knowledge or actions) to a quantitative one (ordering and prioritizing existing knowledge or actions) [Heylighen, 1999, 2007ac]. This will lead to new technologies for intelligent decision support.

Technologies for a Global Brain

The web is the hypermedia interface to the information residing on the Internet. It makes it possible to seamlessly integrate documents that are distributed over the entire planet, and created by people who may not even be aware of each others' existence. What holds these documents together is not their geographic location, but their *associations*: links connecting mutually relevant pages. This hypermedia architecture is analogous to the one of our brain, where concepts are connected by associations, and the corresponding assemblies of neurons by synapses. The web thus functions like a huge associative memory for society.

However, the brain is more than a static memory: it can *learn* and *think*. Learning takes place by the strengthening of associations that are used often, and the weakening of rarely used associations. Through learning, the brain constantly enhances its organization and increases its store of knowledge. Thinking happens by the activation of concepts and the "spreading" of this activation to related concepts, in proportion to the strength of association. Thinking allows the brain to solve problems, to make decisions, and to be creative, that is, discover combinations of concepts never encountered before. By making simple changes to its static architecture, we can implement similar processes on the web.

In the brain, learning follows the rule of Hebb: if two neurons are activated in close succession, the strength of their connection is increased. I have proposed to apply a similar procedure to the web [Heylighen and Bollen, 1996, 2002]: if two web pages are consulted by the same user within a short interval, either the existing hyperlink between the pages gets a higher weight, or a new link is created. On any given page, only the links with a minimum weight are shown. Thus, links that are not sufficiently reinforced may eventually disappear. The result is that such a learning web constantly adapts to the way it is used, reorganizing its pattern of links to best reflect the preferences of its users. In practice, this creates direct links between the pages that are most strongly related, bypassing less interesting detours, and clustering pages together according to their mutual relevance. As such, the web becomes much more efficient to use, by assimilating the collective knowledge and desires of its users.

The simplest way to implement web "thinking" is to create a specialized software *agent*. This is a program that works as a "delegate" of its user,

autonomously collecting information that is likely to be interesting to its user. The agent can learn the user's preferences simply by observing which pages the user actively uses, or it can receive specific instructions (e.g. keywords) from the user. Given that preference profile, the agent can locate pages that satisfy the profile, and then use “spreading activation” to find further, related documents. It does this by “activating” pages in proportion to their degree of interestingness, and then propagating that activation according to the hyperlinks and their weights as learned from other users. Thus, it can discover new documents, that may not contain any of the initially given keywords, but that are still highly relevant to the query. This is especially useful when the user cannot clearly formulate the query, but only has an intuitive feel for it.

With such technologies, the web would become a giant, collective brain, which you could consult at any moment to get an answer to your questions, however unusual or vaguely formulated they may be. Its thought processes would always be ready to enhance and extend your own thinking. To fully harness the power of this global brain, it should be constantly available. The rapid spread of mobile communication already offers universal access to the web, wherever you are. Further miniaturization will lead to wearable computers, incorporated in your clothing, with images projected on your glasses. Automatic recognition of speech, gestures and even emotions will make communication with the web much easier and more intuitive. In the longer term, we can foresee direct connections between computer and brain, through neural interfaces. This would allow you to communicate with the global brain simply by thinking, having your thoughts immediately sensed, understood, and enhanced. Your thoughts could also be directly turned into actions, as when you use the global brain to order a pizza, get a taxi, or switch on the heating, so that it would be nice and warm by the time you come home.

Social benefits

Now that we have a better grasp of how a global brain-like system would function in practice, let us try to summarize its great advantages for society. The market is the collective system of transactions that helps supply to match demand, and thus to fulfill the need of the collective customer for products and services. A traditional market is rather inefficient, requiring a huge infrastructure of middlemen, specialized organizations such as stock exchanges and auctions, and communication channels. The Internet already allows such transactions to take place much more quickly and transparently, with less cost

and effort. This strongly reduces friction, making the economy more efficient so that demand can be satisfied more rapidly, more accurately, and at a lower cost [Heylighen, 2007b]. The global brain will not only facilitate direct communication between buyers and sellers, but help buyers to find the best value (e.g. through shopping agents to compare prices), and help sellers to get the best price (e.g. through auctioning systems).

The net effect is that growth increases, while inflation and economic instability decrease. Moreover, there will be less waste because of unsold items or goods shipped far away when there is demand around the corner. The direct incorporation of collective effects ("externalities") in the decision-making process will moreover allow a more efficient governance over the economy, thus protecting employees and consumers while reducing inequalities and pollution, without the added complexity, bureaucracy and rigidity that tend to accompany such interventions in a traditional political system.

The global brain will moreover help eliminate conflicts. It in principle provides a universal channel through which people from all countries, languages and cultures of this world can communicate. This makes it easier to reduce mutual ignorance and misunderstandings, or discuss and resolve differences of opinion. The greater ease with which good ideas can spread over the whole planet will make it easier to reach global consensus about issues that concern everybody. The free flow of information will make it more difficult for authoritarian regimes to plan suppression or war. The growing interdependence will stimulate collaboration, while making war more difficult. The more efficient economy will indirectly reduce the threat of conflict, since there will be less competition for scarce resources.

Of course, technology alone will not solve all the problems that threaten our planet: in the end, people will have to agree about concrete policies to tackle e.g. global warming or poverty. Yet, the global brain can support not only the process of reaching consensus on a plan of action, but also its practical implementation. For example, combating infectious diseases or pollution will require extensive monitoring of the number of infections or concentration of polluting gases in different regions. Information collected by local observers or by electronic sensors can directly enter the global brain, be processed to reveal underlying trends, and be forwarded to the people or institutions responsible for taking direct action.

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(all my papers can be downloaded via http://pcp.vub.ac.be/HEYL.html)

Networking and mobilizing collective intelligence

Parker Rossman[1]

THINK BIG! Mark Buchanan (2004) wrote about what a billion brains could do, working collectively. He reported on the teamwork, and cooperation that can be seen in the very structure of things. Another kind of `big science for a global age' could be seen if all departments of a university, and of many universities perhaps, all gave a bit of time one year to seeing what they might each contribute to research on a major global human problem like terrorism. Yet Hawley of MIT (2005) notes that the range of student knowledge gets narrower and narrower, with not enough sharing among fields of study, so "we need to be concerned about our intellectual ecology."

Mark Williams (MIT *Technology Review*, Oct. 2006) describes "a "massively multiplayer game"—engaging a worldwide community— that can lead to a kind of `collective intelligence' that can be used "to solve problems no member could solve alone.

Pierre Lévy has proposed a coordinate system of the 'semantic space' structured according to a theory of human collective intelligence. Theoretically, "such an abstract space has infinity of dimensions" but there can be a "more cognitively managed space called a 'digital sphere' that has only 486 dimensions that can be represented by 486 kinds of 'digitongs.' The translation into digitong "has implications for a global online university project."

Early in the twentieth century, at a time of worldwide economic depression and the rise of oppressive totalitarianism, a challenge was issued by H.G. Wells

[1] G. Parker Rossman is a pioneer on the future of the university and the future of global life-long learning. A complete biography is at http://tinyurl.com/3586ul. Reprinted with permission from http://ecolecon.missouri.edu/globalresearch/chapters/2-04.html.

(1933). He said that such crises might be resolved through "effective, well-informed, coordinated sustained human thinking about what needed to be done for humanity as a whole." This would require *worldwide networks of thinking people*. In a section on "a global thinking system," Mayne (1994) examined that challenge. Wells lamented *the "enormous waste of human mental resources" on poorly-thought-through schemes*. Democratic governments, he said, give authoritarian dictators their chance because of a "very slow, slack method of conducting human affairs." The solution would combine intelligence and action, and that would require a better educated and empowered public opinion, especially through the empowerment of mature human networks. Bugliarello (1994) said that human brain power, collective memory and computers can empower networks for larger problem-solving. How?

Bringing Many Minds Together

http://ru3.org/ru3/project/concept/organisation.htm

http://www.innovateonline.info/index.php?view=article&id=45

http://www.wikinomics.com

http://ecolecon.missouri.edu/globalresearch/chapters/3-06.html

When many minds are brought together something unexpected often happens, they often discover creativity and intelligence that no one of them has alone. New technologies coming into being can greatly empower collective intelligence in solving crucial problems. For new systems to enable that, Tyson (2007) notes the importance not of the intelligence of the individual "but how smart is the collective brain power of the entire species." Wikinomics shows how thousands, even millions can collaborate.

Lifelong learning to everyone in the world requires overcoming many of the crises seen in the rest of this volume, and those in volume one, chapter one. Education planners should seek to bring many minds together to do what has never been possible before. Computer networking can be used to *augment* human intelligence, Denning (1997) said, *rather than just seeking to replace it.* Through networking we can draw upon expertise, enable creative thinking and develop collective intelligence. *However we are just beginning to learn how*, in part because although researchers engage in a great deal of networking conversations, too few have given serious attention to online thinking skills.

Making networking work thus for research planning *is a new art, yet to be learned*. Georghieu (1996) has described a three-stage process: (1) find and bring together a panel of experts, (2) consult with sources to learn key issues, trends and possibilities; use Delphi method to distill hundreds of suggestions into a few basic themes and work areas; (3) experiment with various alternatives. How now do we expand that and move beyond it to break new ground in the use of networking for larger research?

Several investigations have shown that *networks know more than the sum of their parts.* Rheingold (2003) pointed out. "Connected and communicating in the right ways, populations of humans can exhibit a kind of collective intelligence" made "possible by the Internet." Intelligence is not restricted to individual brains but is often seen in animal and other groups. "There have been varieties of theories about the Internet as the nervous system of a global brain. So in addition to `artificial intelligence,' researchers are finding that computers can enable a kind of `social intelligence' also. Serious thinking is blossoming on the Internet. We note an expanding number of efforts.

An early example was the 1997 Transatlantic Information Exchange System (TIES) for conversations to address global problems among universities and others in Europe and North America. Its steering committee included members of the European Union parliament, the Library of Congress, the U.S. State Department along with similar officials of European governments. Many less official online conferences are showing how such effective networking need not be complicated, expensive, or limited to officials.

How networking can function was illustrated by the experience of UN-IDNDR (Davies 1997). Someone in Ecuador secured a grant from Switzerland and organized a volunteer team. Webmasters in Australia and Peru used a mainframe computer at San Francisco State University. Various phases of the operation were organized in Costa Rica, learning from a previous online conference where 456 people from 56 countries had participated over 82,000 times. Nearly five hundred worldwide signed on before the Internet conference began. Without a funding grant, $15 from each participant would have financed such a conference for several months. (The equally inexpensive 'global learn day' is, and continues to be, a live, round-the-world conversation, following the time zones (Hibbs 1997). In each time zone, students and faculty have talked live to those in other areas, and from a Hawaii TV station live video of the conference was 'streamed to the Internet.')

For the free-of-charge United Nations conference on natural disasters reduction (International Decade of Natural Disaster Reduction UN-IDNDR 1997), anyone concerned about water-related disasters was invited to participate and to report on specific cases. It brought together specialists, a mix of professions and staff of key policy-making institutions, local to international. Arbib (1997) offers another example, the EMISARI networking system that was designed—with a large data base—to link a national emergency planning office with ten regional centers during a crisis.

Designed to aid in the development of policy, it was networking to a database, not a simulation. It supported a process for two-way sharing of information, for continually revising the database that was accessible to all who needed to make informed decisions. It allowed people in different locations to coordinate their thinking and work so that they could respond quickly to emergencies. The computer was not used to solve problems but to help people do so. The Fermi Lab's high-energy research has involved planning for "the collaboration of hundreds of scientists from far flung laboratories all over the world."

One suggestive metaphor sees online planning conferences as like 'islands that form in the ocean from volcanic activity.' Online planning for mega-research requires bridges to interconnect those many `islands.' Judge (1997) described transformative online conferences with the metaphor of a public chess game. Periods of silence are interspersed with contributions which fit into an emerging pattern on which all participants "will be reflecting."

This process moves beyond current methods of communication as representatives of each scholarly and scientific discipline contribute "specific ideas, values, facts, problems or relationships." The process will interweave into "a complex but healthy ecosystem," using a variety of supporting, guiding, informing, helping roles and will enable collective reflection on more subtle issues and questions. New challenges and processes will emerge. (Judge 1998) Much more is now going to be possible.

http://www.icohere.com

http://www.corante.com/many

Suter et al. (2005) new software for collaborative research and learning that `preserves the *social* context of face-to-face conferences; for example. Such conferences are designed "to stimulate ongoing learning and to invigorate

the intellectual and professional lives of participants. They are automatically introduced to one another along with their special needs and interests. Blogging and wikis can be used.

Managing Better Collective Thinking

http://kmi.open.ac.uk/projects/scholonto

http://www.CompenditumInstitute.org

http://d3e.sourceforge.net

http://www.thetransitioner.org/mt/weblogs/thetransitioner/index.php

http://www.vision-nest.com/cbw/Quest.htm

Across the centuries, whenever scholars have contemplated overwhelming complexity, they have been tempted by two alternatives: (1) to *despair* or *(2) to oversimplify* through specialization and exclusion. The latter alternative has sometimes led to a loss of truth, to manipulation and twisting of knowledge, and at best to overspecialization that neglects other disciplines needed for the whole truth.

S. B. Shum of the (UK) Knowledge Media Institute says that researchers currently lack adequate ways to contest and debate ideas (printed exchange taking months and years) although "multiple perspectives and argumentation must lie at the heart of any system for it to have credibility" Ways to disagree must be built into the process in order for it to have authority. To `plug this gap' Shum proposes `sense making technologies,' for example as seen in the Scholarly Ontologies Project's publishing as a "semantic network of claim-making." and 'Compendium' "for real-time meeting and group memory capture." and the Digital Document Discourse Environment (D3E).for web discussion. He also calls attention to his online *Journal of Interactive Media "*that has adopted a hybrid private/public conversational peer review model since 1996."

Now a third alternative is seen when the Internet expands what scholars like Smith (1994) call 'collective intelligence' (CI). Computer networking can amplify CI to bring *many minds together for deeper, creative, imaginative collective thinking* on issues like how to extend learning to all.

It can empower thinking-in-community, collegial thought in which participants organize their energies to achieve the sum of more than their

separate parts. CI can deal with complexity in ways no one mind alone, nor even one team alone can do. Suppose that each of a thousand universities conducted an ongoing seminar on one of humanity's crucial issues and continued it year after year, connecting a worldwide community of experts online. What existing 'think tank' could rival such a process for experimenting with the possibility of larger and more sustained thinking?

We are warned, however, that 'too many cooks can spoil the broth,' that there is no guarantee that many minds will really come up with new or better ideas and processes. Indeed, the Carnegie Endowment spent three years and nearly ten million dollars to bring together the minds of well informed and internationally experienced people, including prominent diplomats, to see if they could develop some new ideas for resolving international conflicts. The results were meager (Miller 1998). Perhaps they failed because of the tired old method of face-to-face meetings that had no continuing online conversations to invite many others to contribute ideas?

Hiltz and Turoff (1974) used the term CI for "the ability of a group to produce a result that is better than any single individual could achieve alone." They pointed out that this can happen in conventional face-to-face groups, but rarely yet does. Later they decided (1997) that the merger of the *Delphi Method* with *Computer Mediated Communications* opens and enlarges the possibility. Research to develop procedures for implementing collective intelligence online is not yet very far advanced. Even the term is not yet well defined. It has other meanings, for example in biological study of primitive organisms. So *we prefer here to illustrate CI, rather than defining it*, by for example noting a group of Japanese scientists who undertook together a `network adventure,' an effort to fuse many kinds of expertise in a `group quest' by experimenting with a network of minds in an area where no one specialist was adequate to deal with the whole problem.

French Philosopher Pierre Lévy said that CI is the inevitable result of intelligent systems that are structurally coupled through electronic mediation (Pesce 1996). In other words, *connecting intelligences breeds CI and begins to monitor and correct its own behavior* in a way analogous to the human nervous system. It maintains its integrity through the culling out of the superfluous, the outdated and any effort to `own' or monopolize truth.

CI thus *moves beyond hardware engineering to social engineering*. He sees CI in the construction of intelligent communities online in which

communication tools are used for more than simply "to haul masses of information around." Online CI requires and enables the re-creation of a social bond among scholars who have a common purpose.

CI, he says, unites not only ideas, but people. "It is a global project whose ethical and aesthetic dimensions are as important as its technological and organizational aspects." He sees CI as a form of "*universally distributed intelligence, constantly enhanced, coordinated in real time." No one can know everything, so only collectively now can scientists know all they need to know***.** The Cartesian "I know, therefore I am" becomes "We know, therefore we are."

CI is a continuum and is developed through collective discussion, negotiation and imagination. He uses an analogy from ocean navigation. The old-time ship captain's book of information from previous voyages is replaced by accurate maps and satellite information. Through online collective intelligence scholars begin to develop knowledge maps in cyberspace. Next perhaps something akin to satellite guidance will appear for larger-scale research. Meanwhile new suggestions include blogs.

Some researchers, thinking together online, report an occasional experience of synergy that is similar to the surprising and unexpected things that begin to happen when isolated nerve cells in a baby's brain begin to interconnect. We ask if this synergy happens, at least on occasion, as many minds move beyond limited fragmented thinking and overspecialization to new kinds of teamwork/thinking by, for example:

- enlarging the quantity and quality of thoughts as many minds test, correct, and stimulate each other;
- linking people to report significant experiences or demonstrations of success in meeting a need or solving a problem;
- linking widely scattered experts, combining their expertise to amplify many kinds of research;
- and experimenting with entirely new ways of thinking such as using computer mapping of thought patterns, combined with simulations and modeling.

That list suggests an idea that might be researched in a quest for more effective collective intelligence online. Pursuing such research must surely involve cognitive scientists and much more. See George Pór.

Collective Thinking A Process Of Generations

Scholars have always built on the thinking of other scholars, their contemporaries and those in previous generations, including experts from different cultures and schools of thought. Now telecommunications and computer conferencing begin to open a larger intellectual era with the possibility of more comprehensive `collective intelligence' with greater depth, larger scope and more breadth of thought.

One step to *mega-scale thinking* might be taken when every idea in collective memory (beginning with cross-indexed hypertext/hypermedia data bases) can be compared with every other related idea from tradition and from contemporary research. The fusing of expertise through networks of thousands of teams of computer-connected minds may make it possible for individuals, small teams of scholars, and *networks of cooperating researchers to develop more powerful ideas*, data bases and experimental modeling to deal with more difficult crises. Suppose it to be true that network-empowered CI could bring humanity to a *major turning point in intellectual history; one that is beginning to reshape human thought at a level of complexity and comprehensiveness that has never before been possible*.

Howard Rheingold has spoken of 'grass roots group mind' and of `pioneering young infonauts` who are beginning to take minds soaring in ways in which we still have only primitive glimpses. To be able to observe the beginning of hypertext, fantasy amplifiers and mind storms, he has said, is a bit like watching old films of the first flying machines. He has reminded us that when asked what television would be useful for, one of its inventors said it would largely be used for nurses to monitor patients in hospitals. How ironic that our vision of mind-empowered collective intelligence may as yet be as dim as that TV inventor.

The research university at its best has been more than a place where isolated or specialized individuals work. It has also involved collective intelligence, most often seen in the discourse at faculty seminars, scholarly conferences and through peer-reviewed journals. Now networking can enlarge and empower those processes, showing that it is not 'either/or'; face-to-face

meeting and online conferences supplement and empower each other (Gragert 1999, http://isoc.org/oti/printversions/0199prgragert.html).

Experimenting with the Process

http://library.wustl.edu/~listmgr/devel-l/Jul1997/0061.html

www.discusware.com/discus/index.php

We can illustrate with a successful networking process. The June 1997 Global Knowledge (GK97) conference brought 2000 people from all over the world to Toronto. They came to discuss how information-age technology could be used to end poverty. The conference was funded and sponsored by the Canadian government and the World Bank. Over 500 of those present were from the developing world. Computer conferencing was used in preparation in advance, during the face-to-face meeting, and afterwards to enlarge participation worldwide.

In advance of the conference, those who could not come to Toronto were encouraged, for example, to come to an online 'village well' home page on the World Wide Web. There they shared successful, practical things that were being done to solve problems that were on the agenda of the face-to-face assembly; for example, case studies on how isolated women in Pakistan were empowered by using the internet.

The World Wide Web, fax and e-mail were used by people on several continents to participate during the conference, especially in the 116 working groups, each of which focused on a particular problem. Delegates at Toronto came online to exchange ideas with people overseas. Thus data and reports of practical experience were brought into the meetings at Toronto from people participating at a distance.

For example, the impact of the Internet in three schools in Uganda and a report on farmers in drought areas of Africa who were connecting with farmers in the Middle East who had skills in dry agriculture.

Serious thinking together then continued online after the conference. Several spin-off online conferences continued to work on a specific need, such as a plan to develop telecenters in developing world villages (Rossman 18.2). The Internet also became a place for group thinking in preparation for a sequel conference on empowering African women. Plans were being made for two

more such global-scale conferences with online participation to involve many people from poverty areas of the world.

Now contrast that research process with the typical academic conference that brings together hundreds or thousands of scholars and wastes their brain power, by having brilliant minds just listen—hour after hour day after day—as papers are read aloud, often in a dull, non-interactive way. After each presentation a few minutes are given to questioning the speaker. Rarely do such sessions provide enough time for synergistic group thinking. It is often said at such conferences that the serious discussion takes place out in the hall, over meals, or late at night in bars. Perhaps this is why one effort at serious online conversation was called the "Global Ethics Cafe."

From time to time now there are more truly `information-age conferences' where the speeches and papers are put online before the conference. Then when delegates come together they can spend their time in small groups, working over the basic ideas presented. They can put their findings online for further work after the conference. The fact that a record is automatically kept of all that is said during a process of online group thinking represents a vast improvement over telephone conferences. For example, busy people can participate at their own convenience. Many more can think together online, even while everyone `talks at once.' Ideas on any subject can be placed where they belong in the public record of the conversation! The record of the GK97 online discussions was indexed so that a participant could search all the responses by subject, author, or date.

However, an examination of the GK97 online discussions suggests *the need for more research—and more experimentation* with findings of existing research—on how to conduct effective online group thinking. Research is needed on what works and what does not work. How can people really be helped to think together online when they are scattered across five continents? The GK97 moderators chided some North Americans for talking too much—actually typing too much—in a conference intended to give a voice to the developing world. Even so, a better opportunity was provided for all to speak, despite technical or language difficulties. Whatever anyone said was heard and judged on merit. Moderators kept the online participants informed of what was going on at Toronto. They also passed ideas and information from the online participants to face-to-face workshops. Delegates at Toronto expressed appreciation for the thinking of online people and some of them also came

online from time to time to add comments to the e-mail/web discussions. The CU-SeeMe video system was used so that some online participants could see each other.

Participants in a city five thousand miles away can use a computer/TV monitor with a divided screen to see speakers, to access data bases of video material and to participate in several group sessions simultaneously. Consequently, some delegates at a future GK conference may choose to participate online at times, much as some college students at Stanford University prefer to take a course online, from their own dormitory room, rather than going to a classroom. We mention the classroom analogy because students are paying fees that provide for professional paid assistance. Online participants may perhaps need to pay a modest fee also to provide for webmasters and the synthesizer/content analysis needed to monitor and facilitate the process of online group thinking. Unfortunately the needed groupware and other supportive software are not yet adequately developed to insure rigorous and thoughtful analysis of ideas. There will be continuing experimentation with and enlargement of conferencing systems like Discusware that provide for division into many threaded discussion groups.

Online GK97 discussion among many people on four continents, across only three months, produced more text than most people have time to read. Also, the subsection in Spanish, and some translation from English into French, were not much help to participants who could not read and write well in those languages either. Yet if parallel discussions went on in every language, the cross-cultural exchange would have been frustrated; for example, if Japanese participants spoke only with other people who could speak their language. So it was suggested that more synergistic global-scale group thinking might have to wait for automatically translation from the speaker's or writer's tongue into what the hearer or reader can understand. New metaphors and greater insight into cultural barriers to understanding are also needed.

Even so, *language is only one problem*. A Filipino, for example, complained that she did not have the skills or technology to cope with such vast amounts of text. So what would happen if tens of thousands of people joined on online conference? If a hundred thousand joined in to participate online in a United Nations assembly? By what process could local groups participate? Perhaps they could each meet at a community college and then pass on their ideas to a regional university. There might at each level be ‘content analysis’ to

digest and summarize the discussion. Then it might be sent on to international moderators who could organize ideas and suggestions in a global computer matrix. However, local groups cannot just share ideas among themselves if international and intercultural exchange is desired. Conferencing software must provide for horizontal as well as vertical connections so that—when dealing with an international problem—each local or regional group can be linked to include people from other cultures and points of view. Can researchers model the process?

Would not each local group also need to concentrate on one delimited topic or aspect of a large problem if they are to think together in depth or could each local individual join with others elsewhere on one issue? Even then there may be the problem of dealing with a vast amount of text and data. How can they then learn what other groups are thinking, and how it all fits together? One's idealism—that the process can be improved by using new technology—is tempered after reading the complete transcript of one GK97 online session. Some coding helps; for example, a 'T' after the name of a person 'speaking online' means that he or she was "physically present in Toronto" during the discussion. An examination of the transcript shows how much research is needed on how to involve widely separated persons in a significant way; and on how to organize the results to enable a significant group thinking and research process.

Perhaps that conclusion represents a prejudice that `chat rooms' have not become a way to get significant thinking done. They are like the online `discussions out in the hall' after formal sessions. Many GK97 online participants reported that they got bored with the chat-type process although they still wanted to share more ideas and learn more of what others were thinking. Despite problems and difficulties, continuing online listservs—or computer conferences that carry on serious discussion of a particular scholarly topic—are quite successful, even over a long time. This is more likely true when there is a full-time moderator or team with different skills.

One GK97 participant from Asia said: "There are a huge number of talented people around the world who are technological innocents. Information needs to be sorted into categories, i.e. how to deal with this huge volume!" Another said: "Many people are working on automatic classification and filtering (but few) are working to make conferences more effective as a process of `human knowledge exchange."

An evaluator of a GK97 transcript suggested that each participant should be able at any time to click onto a biography and photo of any other participant. Also easy access should be provided to the agenda and to a reminder summary of what has already happened. This could be done with web hyperlinks for automatic jumping to essential data and background information. Comments should be inserted into the right place on the outline rather than just being in a messy chronological order. In a face-to-face meeting anyone who gets a chance to ask a question may have to wait a half hour. Online a reply to another 'speaker' can be inserted in the text immediately following the question that was asked or the idea that was proposed. The online conferencing system can provide a process which allows some participants to `step aside" to continue conversation that interests them when the rest wish to go on to other topics and then also continue to participate in the main session..

Do people think better online when they have a document to work on? What other such questions need research? An Artificial Intelligence/Expert Systems group at GK97 proposed innovative technologies to organize the World Wide Web and "bring order out of chaos." Experts from the National Library of Medicine, the OCLC (Online Computer Library Center) and the Congressional Research Service discussed, for example, automated bibliographic control, machine-generated thesauri and visual data-clustering models. One online GK97 participant made recommendations drawn from the Environmental Decision-Making Research Center in Tennessee. First, he said, participants need to know what decision they want to make, i.e., is it a societal public decision or site specific? Then they must know what kind of information is needed. Third, what tools are needed for responsible decision-making and what are the constraints and policy issues involved in using those tools. Finally, how can the tools be used to choose among alternatives and policy options?

From different perspectives, Robert Steele of Open Source Solutions (OSS) and Jan Wyllie of Trendmonitor tended to agree—during the GK97 online discussions—that it is not necessary for all who are thinking together online to read vast amounts of text. For example, a moderator or team of content analysts might summarize and digest the text, organizing it with graphic 'mind maps' that visually present the organization so that on the Web one can click on any part of the map to get a summary of thinking in that area. Steele pointed to the Alta Vista mapping program in the Java programming language that in 1997 was clustering "key terms and allows low-level browsers to look at

the table of key words." By checking on the terms in the tables, the viewer gets to the 'thread' needed. Many programmers are working on such tools, including those who seek to improve the search engines that hunt for information on the Web.

These GK97 evaluations—and 1998 conferencing in preparation for a successor conference on women in African development—pointed to the need for more research and experimentation, such as that undertaken by experts such as Turoff and Hiltz (1988). As this was written, there were more such projects, such as an online conference on AIDS for ten thousand people online. What research is required for a hundred thousand? *Surely that GK97 experience can be seen as a step towards the type of continuing online research conference that J. F. Rischard of the World Bank proposed in HIGH NOON to deal with society's twenty most crucial issues.*

Defining And Describing Collective Intelligence

http://pespmc1.vub.ac.be/Papers/GOA-project.pdf

Smith (1994), in *Collective intelligence in Computer-Based Collaboration*, reported research seeking "a process model similar to those which have been developed for tasks performed by individuals." In the past, he says, much more attention has been paid to the social activities of groups than to the ways they `think.' So he draws heavily on studies in cognitive science. To do so requires an interdisciplinary approach, involving anthropology, sociology, group dynamics, economics, social psychology, speech communication and more.

Smith's motivation and concern, in part, is "the rapid development of computer networks, distributed systems, and communications" which make it increasingly possible for people to think together when they are widely separated geographically. He begins by asking to what extent a group can function as an "intelligent organism, working with one mind, especially online." If we knew what mode of thinking would constitute collective intelligence, he says, we would better know how to build a computer system to help the process along.

He distinguished between collaborative and collective intelligence, reminding us of the Memex system devised by Vannevar Bush in the early 1920's *to amplify intelligence*. To do so Bush sought to identify aspects of human intelligence: "long-term memory, semantic relationships and associative access." Building upon the ideas of Bush, Smith foresees 'intelligence

amplification' systems which could enable group thinking on a scale and level of significance that until now has been impossible.

Scientists and others usually enter into a group thinking process *when facing a problem that is too large for one person to handle alone*, or when no one member of the group possesses all the skills and knowledge required. Keynes (Mayne 1994) also worried over the fact that politicians know so little and what they need to know "exists in bits and fragments here and there." How can ideas and knowledge help until they are put together holistically? Until that happens, Wells said, "we will (continue to) have a series of `floundering,' ill-directed violent mass movements, slack drifting here and ill-conceived action there."

A computer system and process to support collective thinking, Smith said, would need to help participants analyze a problem. This would generally require an adequate database and software help in considering alternatives. The process would require continuing instruction as the group goes about the task of building "large, complex structures of ideas." An agreed-upon common `wide-area filing system' could then make it possible for anyone, anywhere in the world, to participate.

Smith experimented with software that provided several columns on a monitor where each participant could comment on, rewrite or otherwise edit a common text. Software provided "well-defined social and authority structures," assigning roles to different members of the thinking group. His system was designed for use by people working alone at a distance, or by people who come together at one or more sites. Their workstations were connected to a high-speed network, to hypermedia data storage and to software for audio and visual communications. *Much research, he found, would be required to learn what supporting tools are needed so that "human and data components can best be combined."*

He reported that Newell and Simon, in their model of how human beings carry out complex problem-solving tasks, wanted to simulate human intelligence to function in real human situations and not just as a theoretical model. This meant defining and focusing upon accomplishing specific goals. Smith has proposed research for including collective memory, long-term memory and a working memory of knowledge, the three of which would need multiple processors for large-scale projects. Also needed is a collective strategy to plan, divide shares and bring back together the separate parts of a large task.

Good group thinking does not happen by accident, at least not in large projects that involve a great number of minds.

The *Collaborative Systems Laboratory*, supported by the National Science Foundation, has been developing tools for more effective collective intelligence and "group communication, coordination and decision support. For scientists in different countries to think together online there must be "a comprehensive picture of the project," including "proposals, specifications, descriptions, work breakdown structures, milestones, time units, staffing, facility requirements, budgets, e-mail and library functions, new groupware architecture and more. Some suggest that—as organizations develop CI—there is an analogy between the biological nervous system and organizational networking which also has the functions of memory, communications, collaboration and management.

The emphasis here on the importance of CI is not intended to belittle the role and importance of the individual mind, of the compelling idea, or the great discovery and vision of a 'lone genius.' Instead we are discussing how that genius can also be greatly aided. The processes developed to empower and expand CI can be used by the individual also, for example to cope with a great deal of routine work so that she has more time for creativity. Research into methods for empowering CI "could mean the difference between being run over by the technology and harnessing it."

Pierre Lévy (1997) listed Vannevar Bush, Theodore (Ted) Nelson, J. R. Licklider, Douglas Engelbart and Tim Berners-Lee—inventor of the World Wide Web—as "*the great visionaries* in the history *of collective intelligence* in cyberspace." His eighteen page list of Web pages listed them in these categories:

- The open source movement: collective intelligence in computer programming
- Collective intelligence in the scientific community
- Collective Artificial Intelligence
- Collective intelligence in business
- Collective intelligence in global wisdom
- Collective Intelligence and epistemology, etc

Engelbart (1996) proposed computer 'groupware'—to help people think collaboratively—as a strategic way to create truly high performance human organizations. Across the centuries people have developed what he calls an Augmentation System with two parts: a *human system* and *a tool system*. Digital technology greatly enhances the tool system and, he has pointed out that, "*these digital systems represent a totally new type of 'nervous system' around which we can evolve new, higher forms of social organisms that can cope better "with the complexity and urgency of society's problems*." This will require a "long-term, pragmatically guided, whole-system evolution." Methods for thinking together which have evolved across generations are not abandoned. Technology and research, however, can now be harnessed to achieve higher performance capability. Engelbart expected people to be surprised by how group thinking can be enhanced.

Larger research and experimentation is needed to find out whether *more holistic thinking systems* can be devised, so that researchers can together propose larger and grander schemes and projects. What about modeling seven scholars, each of whom represent one of Howard Gardner's seven or more kinds of intelligence and then model how they work together, using all seven kinds of intelligence. There is some experimentation of that sort with six-year olds. Could there be modeling of social laboratories in which more kinds of intelligence are mobilized to deal with human crises? Fitzgerald (2005) points out how collective intelligence can be seen in the way "groups can often outthink the experts, acting "as parallel-processing decision engines, pooling disparate knowledge to answer even the hard questions." Elsewhere I ask how scholars can move from idea development to simulations and collaboration to examine consequences and possibilities, as in global education planning, before new ideas are acted upon.

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Toward high-performance organizations: A strategic role for Groupware

Douglas C. Engelbart[1]

Abstract

Achieving tomorrow's high-performance organizations will involve massive changes throughout their capability infrastructures. The complexity of implementing these changes will be daunting, and deserves a strategic approach. Groupware will support important, special new knowledge capabilities in these infrastructures, and also can play a key role in an evolutionary strategy.

Introduction: Shared Visions and the "Groupware Community"

Groupware to me, personally, is a strategic means to an important end: creating truly high-performance human organizations. My pursuit began in the '50s, aiming to make our organizations and institutions better able to handle complexity and urgency.

By 1962 I had evolved a basic conceptual framework for pursuing that goal (Ref-1 and Ref-2). I have essentially lived and worked within that framework ever since, steadily evolving it via many relevant experiences.

It is becoming relatively common of late, in the increasing flow of literature about organizational improvement, to highlight the need for the members of an organization to have a shared vision of where and how the organization is moving, in its marketplace and in its internal evolution. I assume that the same principle should be applicable to a looser organizational

[1] *Bootstrap Institute June 1992 (AUGMENT,132811,) bibliographic reference.* This paper was presented at OSS '94,

unit, in this case, to the community consisting of organizations and researchers interested in the overlapping domains of organizational improvement and "groupware," and including the information-system marketplace whose business is providing products and services to end-user organizations.

From my experience, the nature of this shared vision will be the single most important factor in how directly and how well the digital-technology marketplace will indeed support significantly higher organizational capability - which I assume is our basic objective in the evolution of groupware.

My own vision about pursuing high-performance organizations has matured over the years into a quite comprehensive, multi-faceted, strategic framework. It may seem a bit radical in nature, but my continuing hope is that it will be merged into such a shared community vision.

The full purpose of our Bootstrap Institute is to promote constructive dialog with critical stakeholders in the community about this "bootstrap strategy," to facilitate its trial adoption, and to further the strategy's own "continuous improvement."

In this paper I summarize the key elements of this strategic framework and highlight the role that would be played by the "groupware community." In

Ref-3 is an explicit historical treatment that provides a good deal of background on framework development up to 1986.

Also, Ref-4 gives a relatively balanced description of our associated groupware and application developments with an underlying framework treatment.

Capability Infrastructure and its Augmentation System

Any high-level capability needed by an organization rests atop a broad and deep *capability infrastructure* , comprised of many layers of composite capabilities, each depending upon the integration of lower-level capabilities. At the lower levels lie two categories of capabilities: Human-Based and Tool-Based. The functional capabilities of groupware fit into the latter category, along with a wide variety of facilities, artifacts, and other tools.

In pursuit of higher organizational performance, this infrastructure is the obvious focus of attention. Then it is a matter of establishing system and goal perspectives to determine how much of this infrastructure to include as serious

candidates for change, and how radical a change to contemplate. I arrived at a singularly global perspective from the following considerations.

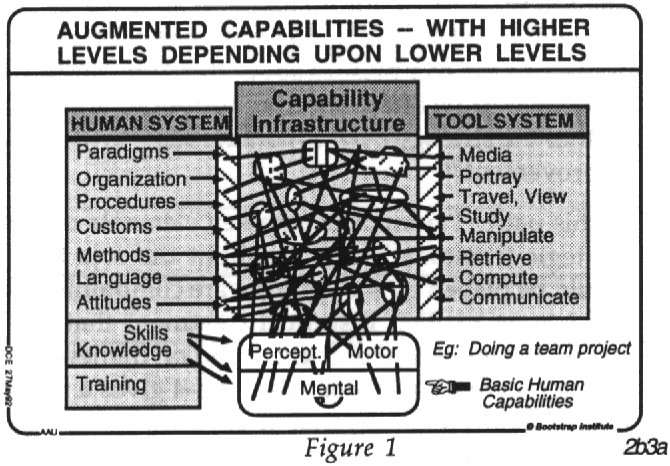

Figure 1: Augmented Capabilities –

with higher levels depending upon lower levels.

[Figure 1 shows a Capability Infrastructure made up of Human System elements -- such as peoples' paradigms, organization, procedures, customs, methods, language, attitudes, skills, knowledge and training -- as well as Tool System elements -- such as media, portrayal, viewing, study, retrieval, manipulation, computing,]

A bit of thinking about this model brought me the realization that we are far short of being able to do a one-pass re-design of any major portion of this capability infrastructure if only because of their pervasive, underlying dependence upon human processes.

And as we pursue significant capability improvement, we need to appreciate that we will be trying to affect the evolution of a very large and complex system that has a life and evolutionary dynamic of its own. Concurrent evolution of many parts of the system will be going on anyway (as it has for centuries).

We will have to go along with that situation, and pursue our improvement objectives via facilitation and guidance of these evolutionary processes. Therefore, we should become especially oriented to pursuing improvement as a multi-element, *co-evolution* process. In particular, we need to give explicit attention to the co-evolution of the Tool System and the Human System.

And, along with these foregoing perceptions, another factor popped into the scene to create a very significant effect on my emergent framework.

The Relevant Implications of Radical Scale Change

Some years earlier, I had studied the issues and prospects associated with extreme miniaturization of functional devices, towards assessing the likelihood of digital equipment becoming extremely small, fast and cheap. I was personally motivated because I would have to be relatively confident of very significant progress in that regard in order to commit a career towards facilitating widespread computer augmentation.

I learned enough to convince myself that, with the expected high industrial and military demand toward digital technology, the achievable limits on micro scalability were far beyond what would be enough to warrant my particular pursuits. And in the process, looking into references dealing with dimensional scale in living things, I became aware of a very important general principle: if the scale is changed for critical parameters within a complex system, the effects will at first appear as *quantitative* changes in general appearance, but after a certain point, further scale change in these parameters will yield ever-more striking qualitative changes in the system.

For example: The appropriate design for a five-foot creature is not that much different from that for a six-foot creature. But the design for either of these would be totally inappropriate for a one-inch creature, or for a thirty-foot creature.

For example: a mosquito as big as a human couldn't stand, fly or breathe. A human the size of a mosquito would be badly equipped for basic mobility, and for instance would not be able to drink from a puddle without struggling to break the surface tension, and then if his face were wetted, would very likely get pulled under and be unable to escape drowning.

The lesson: Expect surprising qualitative changes in structural assemblage and functional performance when a complex system adapts effectively to

drastic changes in critical parameters.

I could only assume that the same is very likely to be true for the complex Augmentation System that supports an organization's capability infrastructure. Here, the radical change in the scale of Tool System capability - in speed, function, capacity, presentation quality, transmission, etc. of emergent digital technology - greatly transcends any other perturbation in system parameters that our organizations have ever needed to adapt to in so short a time as a few decades.

Much more could be said about the scaling issue that is relevant to the general theme of organizational change. Sufficient here to say that these thoughts drove me definitely to view as global and massive both the opportunity and the challenge that we humans were facing with respect to increasing the performance level of the organizations and institutions upon which mankind's continuing existence depends.

The Underlying Importance of Paradigms

In the ensuing thirty years since the model of Figure-1 first evolved, I have become ever more convinced that human organizations can be transformed into much higher levels of capability. These digital technologies, which we have barely learned to harness, represent a totally new type of nervous system around which there can evolve new, higher forms of social organisms.

In the face of mounting evidence that our organizations and institutions cannot cope adequately with the increasing complexity and urgency of our society's problems, it seems highly motivating to explore every avenue that offers reasonable probability of improving their capability to cope.

Those were my thoughts thirty years ago; they seem even more germane today. The technologies have been demonstrated, and our organizations are aligning toward internal improvement. What seems still to be lacking is an appropriate general perception that:

(a) huge changes are likely, and really significant improvements are possible

(b) surprising qualitative changes may be involved in acquiring higher performance; and

(c) there might actually be an effective, pragmatic strategy for pursuing those improvements.

In developing a basic, scalable strategy, the above issues of perception are important enough to warrant being explicitly factored into it. In other words, the strategy should provide for the need of significant shifts in our perception of our likely and possible futures.

Perceptions, shared visions, paradigms - their evolution is *critical* , yet they receive little or no direct developmental attention. The slow, un-shepherded paradigm drifting of the past isn't an adequate process for times when deeper global changes are occurring than ever-before accommodated by such massive social bodies. And the rates of such change are more likely to increase than to diminish.

I interject such thoughts here because I actually believe that what can be produced by the groupware community can make a very large difference (in a proper strategic framework) to our capability for coping with large, complex problems. The ability to acquire this new capability is heavily dependent upon evolving an appropriate paradigm, which result in itself represents the type of complex challenge that our institutions need to become more capable of handling.

This leads to an assumption that an important factor to hope for, in an early stage of the future paradigms possessed by key players in this transformation of our organizations, is the perception of importance and a can-do attitude about consciously cultivating appropriate evolutionary trends and change rates in our future paradigms. Shifting our paradigm about paradigms. What role will you play?

Improving the Improvement Process

The next step in developing an explicit strategic framework was generated from the conceptual content of Figure-1 by asking what sort of investment principles would make sense. I hoped to solicit R&D money and wondered how we might get the best return on those funds in facing this very large, unstructured problem. I also was prepared to invest essentially the rest of my professional career: how should I invest that time to get best net progress? And what basic guidelines should be adopted for launching (bare handed, so to speak) such a program?

The only serious approach that I could imagine, towards really significant improvement, would be a long-term, pragmatically guided, whole-system evolution. I was addressing a very complex system, and the challenge would be further complicated by the fact that the subject organizations would have to keep functioning at better than survival level while undergoing large, systemic changes.

So the image depicted in Figure-2 emerged from realizing that the capability of an organization to improve itself would have to become much more prominent and effective. It then seemed natural to consider a strategy wherein the earliest improvement efforts might be concentrated upon improving this capability (i.e., to improve the organization's improvement capability).

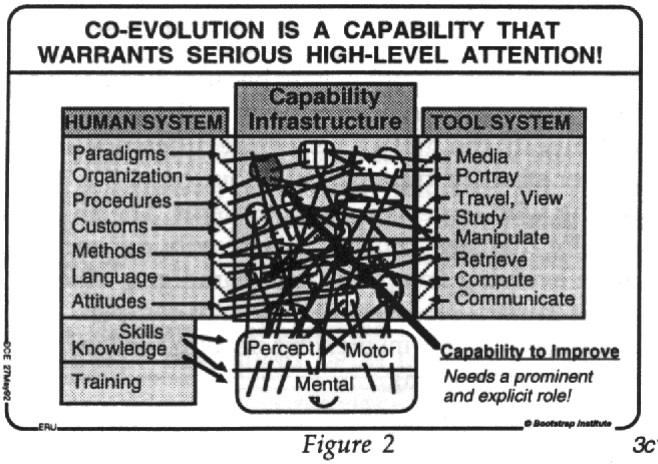

Figure 2: Co-Evolution is a capability that warrants serious high-level attention!

[Figure 2 shows the Capability Infrastructure from Figure 1, with its Human System and Tool System, with a particular high-level capability prominently highlighted and labelled Capability to Improve--needs a prominent and explicit role!]

The ABC Model of Organizational Improvement

In doing some further thinking about improvement activities and the capabilities that support them, I found it useful to extract from Figure-2 a simpler abstraction dealing with organizational improvement, as in Figure-3.

Here we separate the two types of activities, A and B, and show that the capability for each type of work is supported by its respective Augmentation System (comprised of Human and Tool systems).

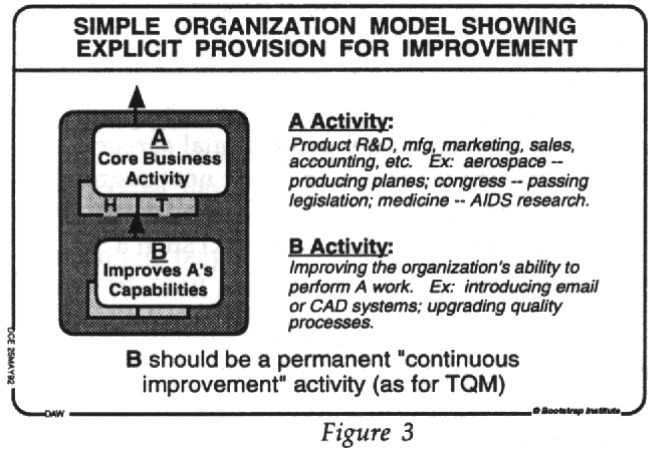

Figure 3: Simple organization model

showing explicit provision for improvement.

[Figure 3 shows an organization with activity A representing the core business activity (i.e. product R&D, manufacturing , marketing, sales, operations...), supported by activity B representing the activity of improving A. B should be a permanent continuous improvement activity. Note that B is improving A"s Human-Tool Augmentation System.]

Given this model, we can now consider the prospects of improving the organization's improvement capability, as discussed earlier in Figure-2, as *improving the capability of the B Activity* . And for such a critical pursuit to be

effective requires yet another explicit organizational activity, depicted in Figure-4 as the organization's C Activity.

Executive efforts to assess and improve B-Activity funding, staffing, and high-level approach would qualify as a C Activity. C Activities would also include introducing new knowledge and skills into the B Activity, providing better means for participatory interaction with its A-Activity clients, or improving how pilot operations are managed.

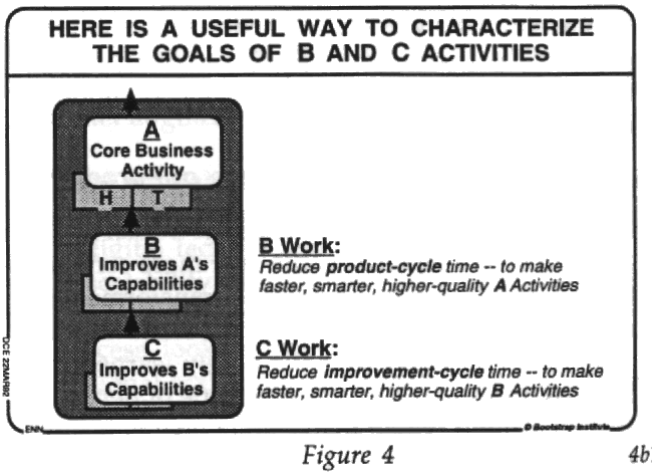

Figure 4: Here is a useful way to characterize the goals of B and C Activities

[Figure 4 shows organization from Figure 3, with A and B activities, with an added C activity which is the activity of improving B activities. B is further characterized as improving product-cycle time and quality, and C as improving improvement-cycle time and quality]

Looking for a Multi-Payoff Capability Cluster

In considering the infrastructure elements that support this higher-level, self-improvement B Capability, I realized that many of its important subordinate capabilities are also actively employed by many of the higher-level A Capabilities that are important to the basic operations of the organization. For

example, identifying needs and opportunities, designing and deploying solutions, and integrating lessons learned. This led to the following rhetorical question:

Is there a set of basic capabilities whose improvement would significantly enhance both the higher-level operational A Capabilities and this self-improvement B Capability?

The answer was a clear "Yes!" A core set of knowledge-related capabilities rapidly emerged as the prime candidate.

An investment that boosts the A Capability provides a one-shot boost. An investment that boosts the B Capability boosts the subsequent rate by which the A Capability increases. And an investment that boosts the C Capability boosts the rate at which the rate of improvement can increase. (To be slightly mathematical, investing in B and C boosts respectively the first and second derivative of the improvement curve - single and double compounding, if you wish.)

We are assuming here that selected products of the two capability-improvement activities (B and C) can be utilized not only to boost the capabilities of their client activities, but can also to a significant extent be harnessed within their own activities to boost their subsequent capability. This is depicted in Figure-5 by the "feedback" paths.

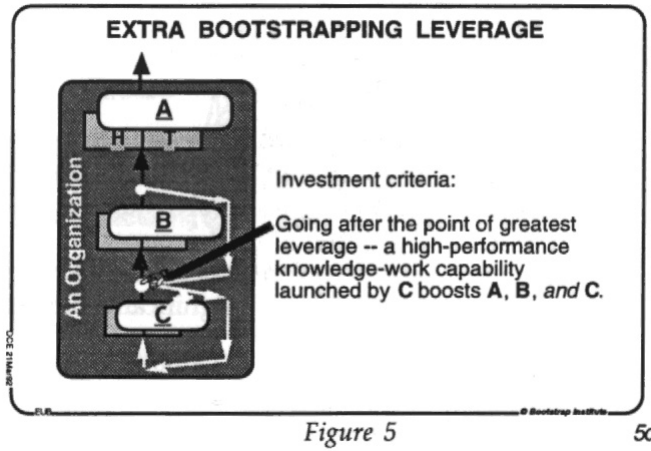

Figure 5: Extra bootstrapping leverage.

[Figure 5 shows the same organization with B boosting A and C boosting B. Added are two feedback loops to illustrate B"s output boosting itself as well as A, and C"s output boosting itself as well as B. C"s output highlighted with the text: Investment criteria: going after the point of greatest leverage--a high-performance knowledge-work capability launched by C boosts A, B, and C.]

This was where the term *bootstrapping* became welded into my continuing professional framework. It turns out that there are many choices that we will face where balanced consideration of the bootstrapping possibilities can make a difference. I place much confidence in the potential payoff from thoughtful application of the principles that have evolved from such thinking.

The CODIAK Process Cluster: Best Strategic Application Candidate

Over the years I have tried various ways to label and characterize the above-mentioned key knowledge capabilities. For lack of an established term, I have settled on an acronym that embraces the main concepts of this cluster of high-leverage capabilities - CODIAK:

***CO**ncurrent **D**evelopment, **I**ntegration and **A**pplication of **K**nowledge*

As complexity and urgency increase, the need for highly effective CODIAK capabilities will become increasingly urgent. Increased pressure for reduced product cycle time, and for more and more work to be done concurrently, is forcing unprecedented coordination across project functions and organizational boundaries. Yet most organizations do not have a comprehensive picture of what knowledge work is, and of which aspects would be most profitable to improve.

The CODIAK capability is not only the basic machinery that propels our organizations, it also provides the key capabilities for their steering, navigating and self repair. And the body of applicable knowledge developed represents a critically valuable asset. The CODIAK capability is crucial in most A Activities across the organization, whether in strategic planning, marketing, R&D, production, customer support, or operations. It is also crucial in the B and C Activities, whether identifying needs and opportunities, designing and deploying solutions, or incorporating lessons learned - which of course is also used in key A-Activity work. As such, the CODIAK capability should be considered a core business competency in the organization's capability

infrastructure, and is an ideal candidate for early improvement to achieve the extra bootstrapping leverage discussed above in Figure-5.

For best exposure to full CODIAK issues, it helps to consider heavy knowledge-intensive activities such as a large, complex project. Figure-6 represents the high-level core of such a CODIAK process. In the center is a basic organizational unit, representing the interactive knowledge domains of a single individual, or of individuals or groups within a project team, department, functional unit, division, task force, committee, whole organization, community, or association (any of which might be inter- or intra-organizational).

Each organizational unit is continuously analyzing, digesting, integrating, collaborating, developing, applying, and re-using its knowledge, much of which is ingested from its external environment (which could be outside of, or within, the same organization).

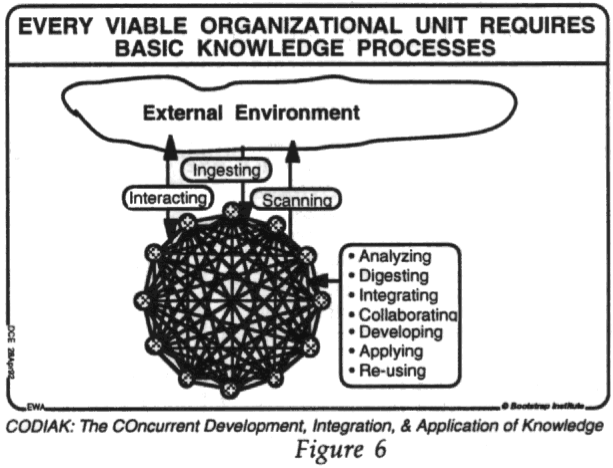

Figure 6: Every viable organizational unit requires basic knowledge processes.

[Figure 6 shows an organization unit in the form of a circle of constituent individuals and/or teams or departments, with lines interconnecting them all with each other representing continuous exchange and communication. The organizational unit is interacting with its external environment, scanning for

and ingesting intelligence, as well as continuously analyzing, digesting, integrating, collaborating, developing, applying, and re-using an evolving knowledge base. This is the CODIAK process.]

A result of this continuous knowledge process is a dynamically evolving knowledge base as shown in Figure-7 below, consisting of three primary knowledge domains: intelligence, dialog records, and knowledge products (in this example, the design and support documents for a complex product).

- **Intelligence Collection:** An alert project group, whether classified as an A, B, or C Activity, always keeps a watchful eye on its external environment, actively surveying, ingesting, and interacting with it. The resulting *intelligence* is integrated with other project knowledge on an ongoing basis to identify problems, needs, and opportunities which might require attention or action.
- **Dialog Records:** Responding effectively to needs and opportunities involves a high degree of coordination and dialog within and across project groups. This *dialog* , along with resulting decisions, is integrated with other project knowledge on a continuing basis.
- **Knowledge Product:** The resulting plans provide a comprehensive picture of the project at hand, including proposals, specifications, descriptions, work breakdown structures, milestones, time lines, staffing, facility requirements, budgets, and so on.

These documents, which are iteratively and collaboratively developed, represent the *knowledge products* of the project team, and constitute both the current project status and a roadmap for implementation and deployment.

The CODIAK process is rarely a one-shot effort. Lessons learned, as well as intelligence and dialog, must be constantly analyzed, digested, and integrated into the knowledge products throughout the life cycle of the project.

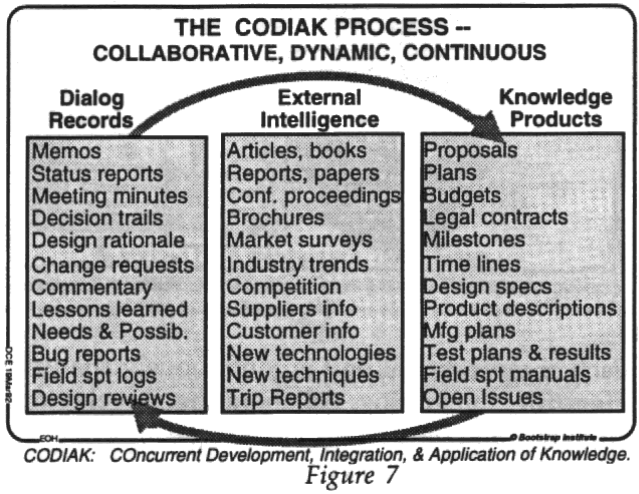

Figure7: The CODIAK process—collaborative, dynamic, continuous.

[Figure 7 itemizes the evolving knowledge base within three categories: (1) Dialog Records: memos, status reports, meeting mints, decision trails, design rationale, change requests, commentary, lessons learned, ... (2) External Intelligence: articles, books, reports, papers, conference proceedings, brochures, market surveys, industry trends, competition, supplier information, customer information, emerging technologies, new techniques... (3) Knowledge Products: proposals, plans, budgets, legal contracts, milestones, time lines, design specs, product descriptions, test plans and results, open issues...]

With minor adjustments in the boxed lists in Figure-7, this basic generic CODIAK model seems to apply equally well to academic scholarship, heavy industry, government, medical research, social institutions, consumer product businesses, consulting firms, trade associations, small non-profits, and so on.

We need to note here that basic CODIAK processes have practically forever been a part of society's activity. Whether the knowledge components are carried in peoples' heads, marked on clay tablets, or held in computers, the basic CODIAK process has always been important.

What is new is a focus toward harnessing technology to achieve truly high-performance CODIAK capability. As we concurrently evolve our human-

system elements and the emergent groupware technology, we will see the content and dynamics represented in Figure-7 undergo very significant changes.

More and more intelligence and dialog records will end up usefully recorded and integrated; participants will steadily develop skills and adopt practices that increase the utility they derive from the increased content, while at the same time making their contributions more complete and valuable.

Generally, I expect people to be surprised by how much value will be derived from the use of these future tools, by the ways the value is derived, and by how "natural and easy to use" the practices and tools will seem after they have become well established (even though they may initially be viewed as unnatural and hard to learn).

Inevitably, the groupware tools which support the CODIAK processes within and across our organizations will need to be fully integrated and fully interoperable. Consider the larger organization depicted in Figure-8 in which our representative complex project may be embedded (for example, in the Engineering Department of a manufacturing organization)

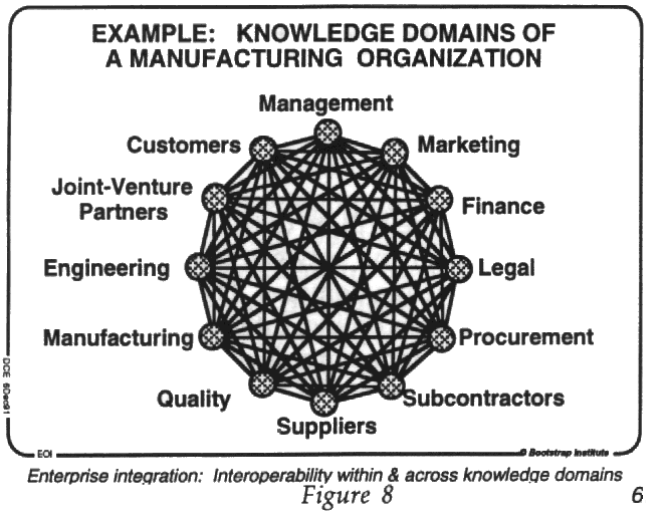

Figure 8: Example: Knowledge domains of a manufacturing organization.

[Figure 8 shows the organizational unit with its constituents in a circle with interconnecting lines, the constituents labeled for a manufacturing organization with Management, Marketing, Finance, Legal, Procurement, Subcontractors, Suppliers, Quality, Manufacturing, Engineering, Joint-Venture Partners, and Customers. Beneath this image is the text: Enterprise Integration: interoperability within and across knowledge domains.]

Each of the enterprise's functional units studded around the circle represents an activity domain that houses at least one CODIAK process. Then, because of their mutual involvement with the operations of the whole enterprise, the CODIAK processes within each of these enterprise sub-domains would with strong likelihood benefit from being interoperable with those of the other sub-domains.

As operations between enterprises steadily become more closely knit, the interaction processes with customers, subcontractors and suppliers also want to become increasingly effective - and therefore the issue of knowledge-domain interoperability becomes ever more global.

As developed in the sections that follow, our framework assumes that all of the knowledge media and operations indicated in Figure-7 will one day be embedded within an Open Hyperdocument System (OHS). Every participant will work through the windows of his or her workstation into his or her group's "knowledge workshop."

With this in mind, consider the way in which the project group's CODIAK domain, with all of its internal concurrent activity, will be operating within the larger enterprise group depicted in Figure-8

And consider that the whole enterprise, acting as a coherent organizational unit, must also have a workable CODIAK capability and possess its own evolving, applicable CODIAK knowledge base.

Here an important appreciation may be gained for the "concurrency" part of the CODIAK definition. CODIAK was introduced above with the sense that all of the development, integration and application activities within a given organizational unit were going on concurrently. *This establishes a very important requirement for the groupware support*

In Figure-9 we get the sense of the multi-level "nesting" of concurrent CODIAK processes within the larger enterprise. Each of the multiply-nested organizational units needs its own coherent CODIAK process and knowledge base; and each unit is running its CODIAK processes concurrently, not only with all of its sibling and cousin units -- but also with larger units in which it is embedded, and with smaller units that are part of its own makeup.

Furthermore, there are many valuable organizational units that cut across the organizational structure - such as a corporate-wide task force - and each of these units also needs a coherent CODIAK process and knowledge base. And beyond that, significant working relationships will be going on with external organizational units, such as trade associations, professional societies, consultants, contractors, suppliers, special alliance partners, customers, regulatory agencies, and standards groups. Each such "external" unit needs to have a coherent CODIAK knowledge domain; all such domains will have some knowledge elements and evolutionary dynamics that are mutual with those of many other units in the enterprise's total CODIAK environment.

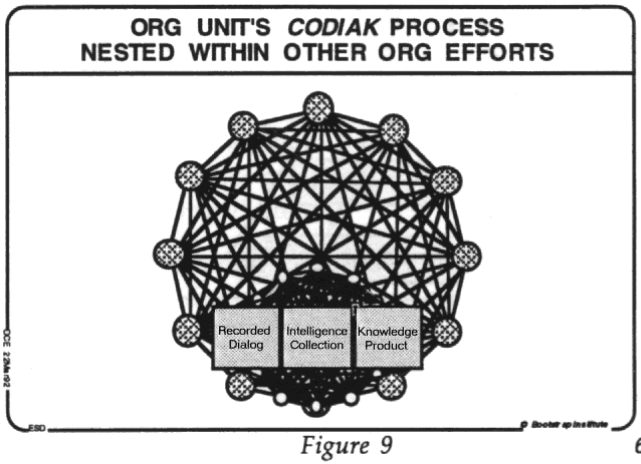

Figure 9: Organizational unit's CODIAK process nested within other organizational efforts.

[Figure 9 shows the organization as one big organizational unit, whose sub-parts are each themselves whole organizational units, each with its own CODIAK process going on, with its evolving knowledge base of Recorded Dialog, Intelligence Collection, and Knowledge Products.]

So, consider the much extended sense of concurrency and inter-dependency arising from the above picture: the CODIAK processes of all of the inter-dependent organizational units within the larger enterprise are going on concurrently; and further, among these concurrently active processes there is a great deal of mutual involvement with parts of the whole knowledge base.

It is easy to realize that significant parts of what the smaller group works with, as being in its "external environment" intelligence collection, will actually be shared-access knowledge from other domains within the enterprise—from other's dialog, from their external intelligence, or from their finished or evolving knowledge products.

Then the entire enterprise has a collective CODIAK domain, with knowledge elements that to some extent will be actually in a "whole-enterprise" domain, but where much of what lies in the collective enterprise domain is an

active part of the CODIAK domains of subordinate organizational units within the enterprise.

And further, consider that as the availability of highly effective online CODIAK support becomes widespread, suppliers, contractors and customers will engage in a non-trivial degree of CODIAK-domain sharing with the enterprise. One needs only a brief glance at the supplier network of Figure-10 to realize the magnitude of critical, interoperable CODIAK processes and shared CODIAK knowledge domains that will prevail when (or if) suitable groupware becomes widely available.

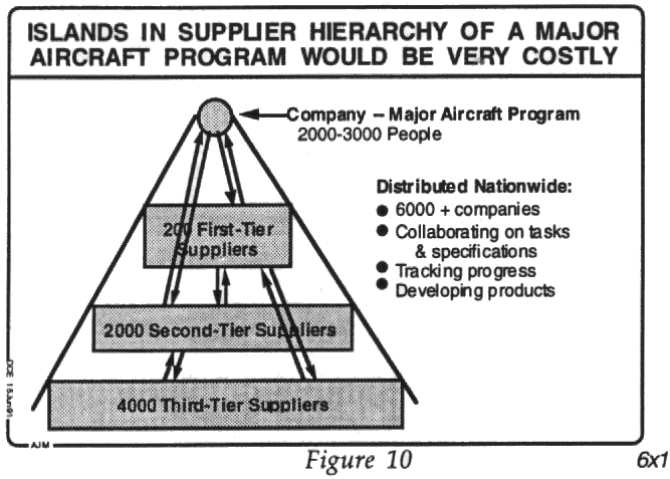

Figure 10: Islands in supplier hierarchy of major aircraft program would be very costly.

[Figure 10 shows as example the organizational unit of a major aircraft program involving 2,000-3,000 people. This program sits at the top of a supplier hierarchy of 1st, 2nd, and 3rd tier suppliers -- up to 6,000 companies -- with communication channels running up and down the hierarchy representing collaboration and coordination on tasks and specifications, change orders, contractual matters, progress tracking, and developing products.]

This is representative of the scale of global challenge that I think faces the groupware marketplace.

The foregoing dictates some very significant requirements for any groupware system that attempts to support the CODIAK processes of our future, high-performance organizations. Immediately apparent is the need for very flexible, wide-area sharing of pieces of the knowledge base. What has only recently begun to be generally apparent is the associated need for a new way of thinking about the nature of the knowledge packages we have called "documents." This above requirement for flexibly arranged sharing of essentially arbitrary knowledge chunks provides a very strong argument for documents becoming built from modular-concept nodes with arbitrary inter-node linking—*hypertext*.

So, how (and when) will the marketplace learn enough and be cooperative enough to develop truly effective OHS standards? The prospects for achieving truly high levels of performance in larger organizations and institutions pretty much await that day.

> *This question is a significant part of what an effective bootstrapping strategy needs to address*

Open Hyperdocument System (OHS): For Generic Support

My early assumption, amply borne out by subsequent experience, is that the basic supporting technology for future high-performance knowledge work will be an integrated system based upon multi-media hyperdocuments.

Furthermore, there will be critical issues of interoperability within and between our organizations and their knowledge domains. The ever-greater value derived from online, interactive work within a hyperdocument environment will require a significantly higher degree of standardization in document architecture and usage conventions than heretofore contemplated.

It is inevitable that this service be provided by an "open system" of hyperdocuments and associated network and server architectures. The basic arguments for this Open Hyperdocument System (OHS) are presented in Ref-5; and the hyperdocument system features described below are assumed by me to be strong candidates for requirements for the eventual OHS whose evolution will be so critical to the productivity of industries and nations.

Following is a brief general description of the system design that has evolved from the conceptual orientation described in this paper, through the experience of many years and trial events. Please note that the term "system" is very important here.

- **Shared Files/Documents -** the most fundamental requirement. Generalized file sharing is to be available across the entire global domain in which any online collaborative working relationship is established (e.g., world-wide).
- **Mixed-Object Documents -** to provide for an arbitrary mix of text, diagrams, equations, tables, raster-scan images (single frames or live video), spread sheets, recorded sound, etc. - all bundled within a common "envelope" to be stored, transmitted, read (played) and printed as a coherent entity called a "document."
- **Explicitly Structured Documents -** where the objects comprising a document are arranged in an explicit hierarchical structure, and compound-object substructures may be explicitly addressed for access or to manipulate the structural relationships.
- **Global, Human-Understandable, Object Addresses -** in principle, every object that someone might validly want/need to cite should have an unambiguous address, capable of being portrayed in a manner as to be human readable and interpretable. (E.g., not acceptable to be unable to link to an object within a "frame" or "card.")
- **View Control of Objects' Form, Sequence and Content -** where a structured, mixed-object document may be displayed in a window according to a flexible choice of viewing options - especially by selective level clipping (outline for viewing), but also by filtering on content, by truncation or some algorithmic view that provides a more useful portrayal of structure and/or object content (including new sequences or groupings of objects that actually reside in other documents). Editing on structure or object content directly from such special views would be allowed whenever appropriate.
- **The Basic "Hyper" Characteristics -** where embedded objects called links can point to any arbitrary object within the document, or within another document in a specified domain of documents - and the link can be actuated by a user or an automatic process to "go see what is at the other

end," or "bring the other-end object to this location," or "execute the process identified at the other end." (These executable processes may control peripheral devices such as CD ROM, video-disk players, etc.).

- **Hyperdocument "Back-Link" Capability -** when reading a hyperdocument online, a worker can utilize information about links from other objects within this or other hyperdocuments that point to this hyperdocument - or to designated objects or passages of interest in this hyperdocument.
- **Link Addresses That Are Readable and Interpretable by Humans -** one of the "viewing options" for displaying/printing a link object should provide a human-readable description of the "address path" leading to the cited object; AND, the human must be able to read the path description, interpret it, and follow it (find the destination "by hand" so to speak).
- **Personal Signature Encryption -** where a user can affix his personal signature to a document, or a specified segment within the document, using a private signature key. Users can verify that the signature is authentic and that no bit of the signed document or document segment has been altered since it was signed. Signed document segments can be copied or moved in full without interfering with later signature verification.
- **Hard-Copy Print Options to Show Addresses of Objects and Address Specification of Links -** so that, besides online workers being able to follow a link-citation path (manually, or via an automatic link jump), people working with associated hard copy can read and interpret the link-citation, and follow the indicated path to the cited object in the designated hard-copy document. Also, suppose that a hard-copy worker wants to have a link to a given object established in the online file. By visual inspection of the hard copy, he should be able to determine a valid address path to that object and for instance hand-write an appropriate link specification for later online entry, or dictate it over a phone to a colleague.
- **Hyperdocument Mail -** where an integrated, general-purpose mail service enables a hyperdocument of any size to be mailed. Any embedded links are also faithfully transmitted - and any recipient can then follow those links to their designated targets that may be in other mail items, in common-access files, or in "library" items.

- **The Hyperdocument "Journal System" -** an integrated library-like system where a hyperdocument message or document can be submitted using a submittal form (technically an email message form), and an automated "clerk" assigns a catalog number, stores the item, notifies recipients with a link for easy retrieval, notifies of supercessions, catalogs it for future searching, and manages document collections. Access is guaranteed when referenced by its catalog number, or "jumped to" with an appropriate link. Links within newly submitted hyperdocuments can cite any passages within any of the prior documents, and the back-link service lets the online reader of a document detect and "go examine" any passage of a subsequent document that has a link citing that passage.

- **Access Control -** Hyperdocuments in personal, group, and library files can have access restrictions down to the object level.

- **External Document Control (XDoc) -** (Not exactly a "hyperdocument" issue, but an important system issue here.) Documents not integrated into the above online and interactive environment (e.g. hard-copy documents and other records otherwise external to the OHS) can very effectively be managed by employing the same "catalog system" as for hyperdocument libraries - with back-link service to indicate citations to these "offline" records from hyperdocument (and other) data bases. OHS users can find out what is being said about these "XDoc" records in the hyperdocument world.

The overview portrayal in Figure-11 shows the working relationships between the major system elements described above. Note the shared catalog service that supports use of the Journal and External Document services.

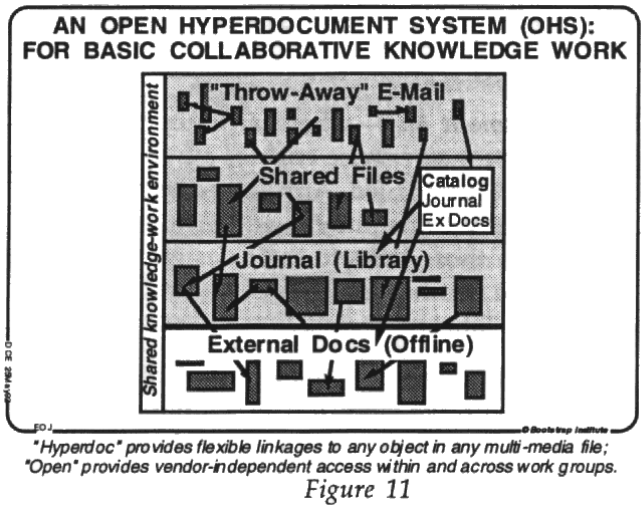

Figure 11: An Open Hyperdocument System (OHS): For basic collaborative knowledge work.

[Figure 11 shows the knowledge environment provided by open hyperdocument systems would include Shared Files, Throw-Away Email, Journal/Library, and External Docs (XDOC). Documents are shown in these four areas, with hyperlinks between documents in different areas. Hyperdocument is defined as providing flexible linkages to any object in any multi-media file... Open is defined as providing vendor-independent access to the hyperdocuments within and across work groups, platforms, and applications.]

Details of features and designs for well-developed prototypes of some of the above may be found in Ref-6, Ref-7 and Ref-8.

Four General Groupware Architectural Requirements

Besides the aforementioned Hyperdocument Mail and Hyperdocument Library features that depend upon special larger-scale architectural features, there are at least four other important tool-system capabilities that are very important to wide-area groupware services such as being considered here:

Global and Individual Vocabulary Control —somewhat new in the history of computer services are issues regarding the evolution and use of a common "workshop vocabulary" among all the users of the forthcoming "global knowledge workshop." Common data dictionaries have been at issue, of course, but for a much more limited range of users, and for a more limited and stable vocabulary than we will face in the exploding groupware world. ***7B***

Our own architectural approach (see Ref-6, Ref-9 and Ref-10) has been to introduce into every user-interface environment a common Command-Language Interpreter (CLI) module that derives the user's available operations (verbs) as applied to the available classes of objects (nouns) from a grammar file (individualized if desired with respect to the size and nature of the verbs and nouns utilized from the common vocabulary). The CLI interprets user actions, based upon the contents of the currently attached grammar file, and executes appropriate actions via remote procedure calls to a common application program interface of the "open system environment."

Each of us knowledge workers will become involved in an ever richer online environment, collaborating more and more closely within an ever more global "knowledge workshop," with multi-organizational users of widely divergent skills and application orientations who are using hardware and software from a wide mix of vendors.

Without some global architectural capability such as suggested above, I can't see a practical way to support and control the evolving global "workshop vocabulary" in a manner necessary for effectively integrating wide-area groupware services.

Multiplicity of Look-and-Feel Interface Choices—Based upon the same Command-Language Interpreter (CLI) architecture as above, a "look-and-feel interface" software module would be located between the CLI and the window system. Providing optional modules for selected look-and-feel interface characteristics would serve an important practical as well as evolutionary need.

There would be a basic constraint necessary here. When working interactively, no matter what particular look-and-feel style is being used, a user has a particular mental model in mind for the significance of every menu item, icon, typed command, or "hot, command-key combination" employed.

The necessary constraint needed here is that the resulting action, via the interface module that is being employed for this user, must be produced

through the underlying execution of processes provided by the Command Language Interpreter module as derived from use of common-vocabulary terms. And the users should learn about their tools and materials, and do their discussing with others about their work, using the underlying common-vocabulary terms no matter what form of user interface they employ.

Besides relaxing the troublesome need to make people conform to a standard look and feel, this approach has a very positive potential outcome. So far, the evolution of popular graphical user interfaces has been heavily affected by the "easy to use" dictum. This has served well to facilitate wide acceptance, but it is quite unlikely that the road to truly high performance can effectively be traveled by people who are stuck with vehicular controls designed to be easy to use by a past generation.

As important classes of users develop larger and larger workshop vocabularies, and exercise greater process skill in employing them, they will undoubtedly begin to benefit from significant changes in look and feel. The above approach will provide open opportunity for that important aspect of our evolution toward truly high performance.

Shared-Window Teleconferencing ±where remote distributed workers can each execute a related support service that provides the "viewing" workers with a complete dynamic image of the "showing" worker's window(s). Used in conjunction with a phone call (or conference call), the parties can work as if they are sitting side-by-side, to review, draft, or modify a document, provide coaching or consulting, support meetings, and so on. Control of the application program (residing in the "showing" worker's environment) can be passed around freely among the participants. Generic provision of this service is discussed in Ref-6

Inter-Linkage Between Hyperdocuments and Other Data Systems - for instance, a CAD system's data base can have links from annotations/comments associated with a design object that point to relevant specifications, requirements, arguments, etc. of relevance in a hyperdocument data base - and the back-link service would show hyperdocument readers which passages were cited from the CAD data base (or specified parts thereof).

Similarly, links in the hyperdocuments may point to objects within the CAD bases. And, during later study of some object within the CAD model, the back-link service could inform the CAD worker as to which hyperdocument

passages cited that object.

The CODIAK Process Supported by an OHS

With the above tool capabilities, together with well-developed methods and other human-system elements as discussed in section 1.2, the organization's capability infrastructure could support the following types of online CODIAK scenarios.

Note that the following online interactions are designed to work even if the users are in different organizational units, in different organizations, using different application packages on different workstations (assuming access to the data is not barred by the stringent privacy features, naturally). The real test of an OHS is when you can click on a link you received via email from someone in a different organization, jumping directly to the passages cited, and then comfortably maneuver through the "foreign" knowledge domain, possibly jumping up a level with an outline view to see the context of the given passage, following other links you find there, and so on, *without having to fumble through unfamiliar processes*

Intelligence Collection: Now an alert project group, whether classified as an A, B, or C Activity, can keep a much enhanced watchful eye on its external environment, actively surveying, ingesting, and interacting with it mostly online. Much of the external intelligence is now available in hyperdocument, multimedia form, having been captured in an OHS Journal facility. When I send you an email to let you know about an upcoming conference, I can cite the sessions I think you'd be interested in, and you can click on the enclosed citation links to quickly access the cited passages (taking advantage of hypertext links and object addressability). When I do a search through the Journal catalogs to research a question for the proposal I am writing, I can see who has cited the material and what they had to say about it. If the material is offline (i.e. in XDoc), I can quickly discover where it is stored and how to obtain a copy, probably requesting it via email.

If the material is online, I can access it instantly, usually starting with a top-level outline view of the document's titles (taking advantage of the OHS document structure and custom viewing features), possibly setting a simple filter to narrow the field, then quickly zooming in on the specific information I require. I can quickly build an annotated index to the intelligence documents, or objects within those documents, that I want to keep track of. I can share with

you a macro I wrote to trap certain incoming intelligence items and reformat them in a certain way, and you could fire this up in your own environment to work off your pet keywords (taking advantage of the common-vocabulary architectural feature). All the intelligence collected is easily integrated with other project knowledge.

Dialog Records: Responding effectively to needs and opportunities involves a high degree of coordination and dialog within and across project groups. In an OHS environment, most of the dialog will be conducted online via the Journal. Email would be used mostly for "throw-away" communiqués, such as meeting reminders. All memos, status reports, meeting minutes, design change requests, field support logs, bug reports, and so on, would be submitted to the Journal for distribution.

Asynchronous online conferencing would be supported by the Journal, with each entry tagged and cataloged for easy future reference. Document exchange would be a matter of submitting the document to the Journal with a comment such as "Here's the latest version - please note especially the changes in Section G, differences are listed in File Y" including links to that section and that file for easy access. The reviewers would click on the links, and proceed to review the document. To make a comment, the reviewer would click on the object in question, and enter the comment, such as "Replace with 'Xyz'," or "Watch out for inconsistencies with Para G4!" with a link to the passage in G4. The author then gets back the indexed comments, and has many options for quickly reviewing and integrating them into the document. Such dialog support will obviate the need for many same-time meetings.

Same-time meetings, when needed, would be greatly enhanced by an OHS. The dialog motivating the meeting would already be in the Journal. Agenda items would be solicited, and the agenda distributed via the Journal. At the meeting, the agenda and real-time group notes can be projected on a large screen, as well as displayed on each participant's monitor (using the "shared screen" feature), and any participant can point to the displayed material (e.g. using a mouse). Controls can be passed to any participant to scribble, type, or draw on this virtual chalkboard. Any presentation materials and supporting documents can be instantly retrieved from the knowledge base for presentation. All resulting meeting documents, along with references to supporting documents cited, would subsequently be submitted to the Journal for immediate access by all authorized users.

In addition, tools will soon become generally available for flexibly contributing, integrating, and interlinking digitized speech into the OHS knowledge base. Early tools would be available for speaker recognition, for special-word recognition, and even for basic transcription to text - and for installing and following links between modules as small as a word embedded in a long speech string. This will greatly enhance the development, integration, and application of dialog records. More elegant tools will follow, and as human conventions and methods evolve to make effective use of the technology, the quantity and completeness of recorded dialog will become much more significant.

Knowledge Product: Throughout the life cycle of the project, the online OHS knowledge product will provide a truly comprehensive picture of the project at hand. Intermediate project states, including supporting intelligence and dialog trails, can be bundled as document collections in the Journal for document version management. All knowledge products will be developed, integrated, and applied within an OHS, with concurrent contributions from many diverse and widely distributed users. These users can also work as if sitting side by side, reviewing a design, marking up a document, finalizing the changes, etc. (using the shared screen feature).

Finding what you need among the thousands of project documents will be a simple matter of clicking on a link (provided by the Journal catalogs, or by your project's indices), and zooming in and out of the detail, or by having someone else "take you there" (using the shared screen feature). Accountability is absolute- Journal submittals are guaranteed to be authentic, and each object can be tagged by the system with the date and time of the last write, plus the user who made the change. Documents can be signed with verifiable signatures.

Everyone is but one quick "link hop" away from any piece of knowledge representation anywhere in the whole knowledge collection. Smart retrieval tools can rapidly comb part or all of the collection to provide lists of "hit links" with rated relevance probabilities.

Conventions for structuring, categorizing, labeling and linking within their common knowledge domain will be well established and supportive of a high degree of mobility and navigational flexibility to experienced participants - much as residents get to know their way effectively around their city if they get much practice at it.

As a group adapts its ways of working to take better advantage of a tool system such as projected here, the classes of knowledge objects will grow, as will the functions available to operate upon them-and that growth will be paralleled by the concurrent evolution of an ever richer repertoire of the humans' "workshop knowledge, vocabulary, methodology and skills."

There is tremendous potential here, and many methods, procedures, conventions, organizational roles to be developed in close association with the tools. And, if the OHS is to be open, there is much deep exploration to be done into different application domains, such as Computer-Supported Cooperative Work (CSCW), organizational learning, Total Quality Management (TQM), Enterprise Integration (EI), program management, Computer-Aided Software Engineering (CASE), Computer-Aided Engineering (CAE), Concurrent Engineering (CE), organizational memory, online document delivery and CALS, and so on. This will require many advanced pilots, as will be discussed further on.

Recap: The Framework to this Point

To this point in the paper, we have outlined steps in the development of a strategy to provide a high-leverage approach toward creating truly high-performance organizations.

We considered the concept of the organization's *capability infrastructure* upon which any of the organization's effectiveness must depend.

Further, what enables humans to exercise this infrastructure of capabilities is an Augmentation System, which is what provides the humans with all capabilities beyond their genetically endowed basic mental, motor and perceptual capabilities. It was useful to divide the *Augmentation System* into two sub-systems, the Human System and the Tool System. "Organic style *co-evolution* " among the elements of our Augmentation System has been the process by which it evolved to its current state.

New technologies are introducing an unprecedented scale of improvement in the Tool System part of the Augmentation System. This promises that subsequent co-evolution of our Augmentation Systems will likely produce radical *qualitative* changes in the form and functional effectiveness of our capability infrastructures, and hence of our organizations.

Very large and challenging problems are envisioned in pursuing potential

benefits of such changes, towards truly high-performance organizations. A strategy is sought to provide an effective approach.

It would be profitable to consider early focus on improving the organizational improvement process so that further improvements can be done more effectively.

To help with this analysis, the *ABC* categorization of improvement-process was established. And the thesis was developed that the *CODIAK* set of knowledge capabilities - the *concurrent development, integration, and application of knowledge* - is important to all three types of activities. Therefore, if CODIAK improvement was concentrated upon early, the result could improve the first and second derivatives of the return on future improvement investments.

An *Open Hyperdocument System* (OHS) would be a key "Tool System" development towards improving general and widespread CODIAK capabilities within and between organizations. And creating a truly effective OHS would in itself be an extremely challenging and global problem for our groupware marketplace.

So, high-performance organizations: great opportunities, interesting concepts, tough challenges. What next regarding strategy?

C Community: High-Payoff Bootstrapping Opportunity

Returning to the basic ABC Model in Figure-4, we can make a few useful observations toward a next step in strategy development. This model will be useful even if the Bootstrapping approach is not followed; it is valuable to become explicit about differentiating responsibilities, functions and budgets between the two levels of improvement activity (B and C).

If explicit C roles are designated and assumed, basic issues will soon arise for which the C-Activity leaders find it valuable to compare experiences and basic approaches with their counterparts in other organizations. For instance, what budgeting guidelines and targets make sense for these improvement activities? How much can it help the B Activity to document the way things are done now? What role should pilot applications play? How large an improvement increment, for how big a group, does it make sense to try for a pilot? How much "instrumentation" of a pilot group - before, during, and after

transition - to measure the value of the effort? These are all relevant to making the B Activity more effective.

So let us consider formalizing and extending the above type of cooperation among improvement activities, especially the C Activities. In the mid-60s I began to think about the nature and value of communities of common interest formed among different improvement activities. This led me very early to build explicit planning into the bootstrap strategy for forming improvement communities.

In Ref-11 (1972), I presented the concept of a "community knowledge workshop" -- outlining the tools we had developed for supporting it (including many of the hyperdocument system capabilities outline above), and described the three basic CODIAK sub-domains: recorded dialog, intelligence collection, and what I then called the "handbook" (or knowledge products).

After the ABC Model emerged in the framework, this evolved into a special emphasis on an important launching phase, for forming one or more special bootstrapping *C Communities* as shown in Figure-12

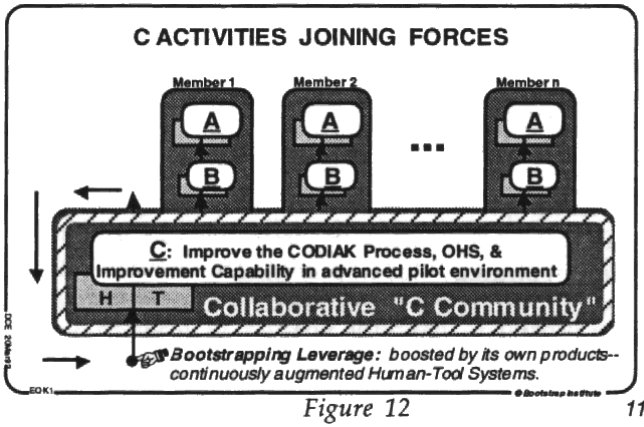

Figure 12: C Activities Joining Forces

[Expanding on the ABC activities of the organization, Figure 12 shows several organizations, each with A, B, and C activities, joining together at the C level to form a collaborative C Community to work on common challenges, such as

improve the CODIAK process, pursue the enabling OHS technology, and improve the improvement capability, within an advanced pilot environment. The output of the C Community boosts the B activities within the member organizations, and also feeds back to boost the C activities. The feedback loop is highlighted with the text: Bootstrapping Leverage: boosted by its own products--continuously augmented Human-Tool Systems.]

The value of such a cooperative activity can be very high we'll unveil some of that later. First, there are some other questions that naturally arise which need to be addressed. An early and common pair of comments are: "I can't imagine sharing things with my competitors, there is so much about what we do that is proprietary;" and, "If they aren't in the same business, I don't see what useful things there would be that we could share."

About proprietary matters: The A Activity of each organization may be very competitive, with considerable proprietary content. The B Activity of each would tend to be less so - having quite a bit that is basic and generic. The C Activity of each would be much less involved in proprietary issues, and much more in basic, generic matters. So even competitors could consider cooperating, "out of their back doors" - "while competing like hell out of our front doors," as a trend that seems to be appearing among companies heavily into Total Quality Management and pursuit of the Malcolm Baldridge Award.

About being in very different business: Again, their B Activities will be much less different, and their C Activities surprisingly alike in important basic and generic issues.

Now, consider how a C Community could operate if it had the basic hyperdocument tools described above. For several decades, my colleagues and I have had such a system available, so all of our scenarios began there, using that system and calling it our "OHS, Model 1" - or "OHS-1."

And how would an ideal bootstrapping C Community operate? Its earliest focus would be on augmenting its own CODIAK capability. Using OHS-1 to do its work; making an important part of its work at first be to establish requirements, specifications and a procurement approach for getting a set of rapidly evolving prototype hyperdocument systems (e.g. OHS-2, -3, etc.), to provide ever better support for serious pilot applications among the C Community participants.

The Community's basic knowledge products could be viewed as dynamic electronic handbooks on "how to be better at your improvement tasks," with two customer groups: its B-Activity customers; and the C Community itself. Pooling resources from the member organizations enables a more advanced and rapidly evolving prototype CODIAK environment, which serves two very important purposes:

1. It provides for the Community getting better and better at its basic "C Activity;"

2. It provides advanced experience for its rotating staff of participants from the member organizations. They thus develop real understanding about the real issues involved in boosting CODIAK capability - this understanding being absorbed by "living out there in a real, hard-working CODIAK frontier." Note that it would be much more expensive for each member organization to provide equivalent experience by operating its own advanced pilot. Also the amount of substantive knowledge product developed this way would be very much more expensive if developed privately.

An important feature: once the Community stabilizes with effective groupware tools, methods and operating skills, the participants from the respective member organizations can do most of their work from their home-organization sites. This provides for maintaining the organizational bonding which is very important in effective C and B activities.

This home-site residency also facilitates the all-important "technology transfer" from the C Community into its customer B Activities. And, while considering the issue of "technology transfer," note that a strong feature of an augmented CODIAK process is the two-way transfer of knowledge. Developing dialog with the B clients via joint use of the hyperdocument system not only facilitates directly this two-way knowledge transfer, but provides critically important experience for the B people in the close witnessing of how advanced CODIAK processes work.

To characterize the value of facilitating this two-way transfer, consider Figure-13, which highlights the basic importance of improved CODIAK processes in the organization's improvement activity. The "1, 2, 3" points all are basic to the CODIAK process. As augmented CODIAK capabilities make their way up from C to B and into A, the over-all improvement process can't help but improve. And also, note that when the A Activity for this organization, as well

as those for its customers, become based on interoperable CODIAK processes, the dynamics of the whole business will begin to sparkle.

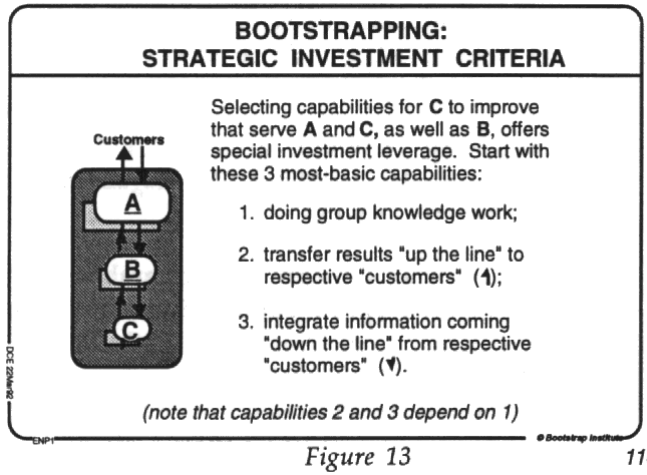

Figure 13: Bootstrapping: Strategic Investment Criteria

[Figure 13 shows the ABC model of the organization from Figures 3 and 4, with text: Selecting capabilities for C to improve that serve A and C, as well as B, offers special investment leverage. Start with these 3 most-basic capabilities: (1) doing group knowledge work, (2) transfer results up the line to respective "customers", (3) integrate information coming down the line from respective "customers". Note that capabilities 2 and 3 depend on 1.]

Now consider Figure-14, and note that the indicated types of knowledge flow are basic to the CODIAK processes, and that augmenting those processes for the C Community directly boosts one of its core capabilities. Conversely, Figure-15 emphasizes the previous basic point of the naturalness for enhanced CODIAK to improve this outflow, and highlights again the basic bootstrapping value that is obtained from early focus on these CODIAK processes.

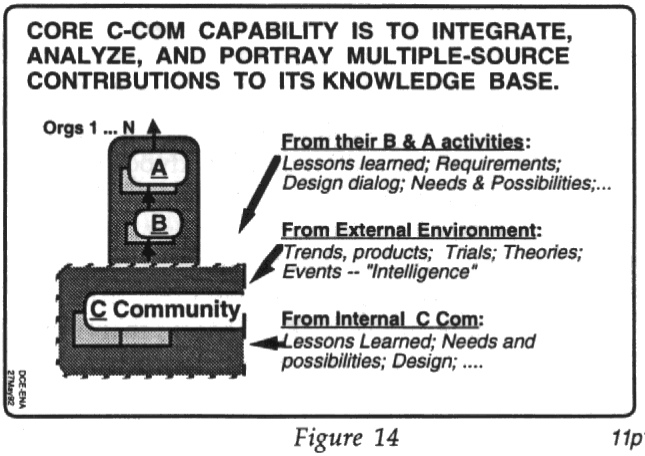

Figure 14: Core C-Community capability is to integrate, analyze, and portray multiple-source contributions to its knowledge base.

[Figure 14 shows the C Community from Figure 12 with contributions to its knowledge base coming from multiple sources: (a) from their B & A activities: lessons learned, requirements, design dialog, needs and possibilities, (b) from external environment: trends, products, trials, theories, events..."intelligence", (c) from internal C Community: lessons learned, needs and possibilities, design, ...]

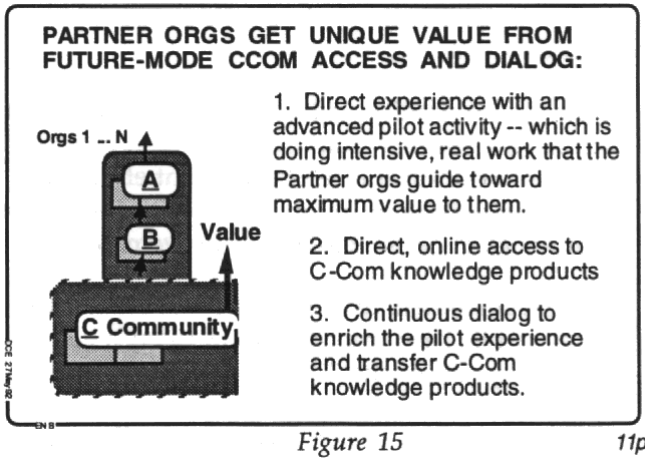

Figure 15: Partner organizations get unique value from future-mode C-Community access and dialog.

[Figure 15 shows the C Community from Figure 12 with Value coming out of the C Community in the form of: (1) Direct experience with an advanced pilot activity, which is doing intensive real work that the partner organizations guide toward maximum value to them, (2) Direct online access to C-Community knowledge products, (3) Continuous dialog to enrich the pilot experience and transfer C-Community knowledge products.]

In the organizational improvement domain, there are several immediately apparent large and explicit issues for which a lone organization would need to consider a multi-party alliance. An immediate such issue, from the bootstrapping point of view, is to procure appropriate groupware systems that can support advanced pilot applications. Other large-sized issues have to do with "exploration and outpost settlements."

Relative to the options opening to our organizations for transforming into new states, there is a very large, unexplored, multi-dimensioned frontier out there. Both its dimensionality and its outer boundaries are expanding faster and faster. To really learn about that frontier, in order to decide where we would want to "settle our organizations," we must somehow do a great deal of basic exploration work. We also need to establish a significant number of outpost

settlements in promising places so as to find out ahead of time what it would be like to really live and work there. (Translate "outposts" into "advanced pilot groups.")

Yet we are launching very few exploratory expeditions and developing very few significant outposts

From the viewpoint that I have acquired, there is a great need for such explorations and trial settlements. Much of my motivation for advocating such as C Communities, bootstrapping, CODIAK and OHS pursuits, etc., is to find a strategy for exploring and settling that territory. It is almost like a military strategy: "first we get a firm settlement here in CODIAK territory; then with that as a base, we encircle the OHS and C territories; when we get those under reasonable control, we will be in a most advantageous posture to pour through the rest of the B and C Improvement Territories to get the whole area under control and ..."

As the C Community and its working relationship with its "B customer" matures, there can be integrated into the substance of their joint efforts an ever larger sphere of involvement with the whole set of issues of organizational improvement.

Potential customers for augmented CODIAK capabilities can be seen everywhere in today's global society: e.g., all of the "Grand Challenges" earmarked in the U.S. for special support. Essentially every professional society will eventually operate this way; as will legislative bodies and government agencies, and university research programs.

In short, our solutions to every other challenging problem that is critical to our society will become significantly facilitated by high-performance CODIAK capabilities. Provides a stimulating challenge for the groupware community, doesn't it?

In closing, I would like to re-emphasize the comments in Section 1.4 (2D) about paradigms. I am convinced that cultivating the appropriate paradigm about how to view and approach the future will in the pursuit of high-performance organizations be the single most critical success factor of all.

[Note: The Bootstrap Institute has developed basic plans for several scales of C-Community launching - a medium-sized consortium approach on the one hand, and a more conservative, organic evolution approach on the other hand. Interested inquiries are invited.]

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Ref-12. Grenier, R., Metes, G. 1992. *Enterprise Networking: Working Together Apart* . Digital Press. (Very relevant general treatment; special emphasis given to "Capability-Based Environment" along the lines outlined in this paper.)

Ref-13. Parunak, H.V.D. 1991. "Toward Industrial Strength Hypermedia", *Hypertext / Hypermedia Handbook* , Kerk, E. and Devlin, J. (eds), New York: McGraw Hill, pp. 381-395. (Provides very useful considerations relevant to requirements for the Open Hyperdocument System as discussed in this paper.)

Search panacea or ploy: Can collective intelligence improve findability?

Stephen E. Arnold[1]

Introduction

Several years ago, Microsoft asked me what I knew about social search. I wrote a report that identified Eurekster (www.eurekster.com) as an early entrant. I identified a number of research groups and fledgling efforts in Silicon Valley to tap "the wisdom of crowds." I concluded that social search was one angle that might be used to slow down the Google juggernaut. The big finding was that social search was less of a technology and more of a consequence of the use of the Internet as a spiffed up version of AT&T's party line. Listening in was great fun when families shared telephone lines. Social search and its variants was an outgrowth of the Internet's increasing popularity.

Search and retrieval gets a remake every few years. Text mining and discovery tools surged with injections of U.S. Government money when budgets for human analysts were slashed. After 9-11, technology that had languished in the shadows took center stage. Key word retrieval is useful for certain types of research. Laundry lists of results required a human to sift through them. Natural language processing, the Semantic Web, LSI (latent semantic indexing), and predictive analytics offered what key word retrieval could not—provide an overview, allow point-and-click discovery, and

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identification of the nuggets of information needed to answer a question or solve a problem.

Social search in all its many forms can be quite useful. It allows individuals to identify a particular source that struck a person as useful. If several people identify that source as valuable, the “collective intelligence” of the users has filtered the wheat from the chaff. Instead of being the solution, social search is one more technique in information retrieval.

Placing too much or too little emphasis on it is risky. Like other search techniques, social search can be useful. Social search does have a downside because several people acting in concert can distort the system. Examples of this may be found on Digg.com, Reddit.com, and Delicious.com every day.

What's difficult to understand is how much of search and retrieval is a product of marketing hyperbole. There is significant dissatisfaction with most search systems. When users have a problem and the existing products leave a need unmet, marketers are quick to exploit the sales opportunity.

Consider that marketing is now more important than technology. Google offered a basic vanilla search Appliance and sold 10,000 customers a box on the strength of Google's Web search and the assertion that the Google Appliance made enterprise search easy. Enterprise search is not easy with or without a stack of cheery yellow Google GB 8008s.

Buzz goes a long way in search. The San Francisco area company Powerset demonstrated its public relations expertise as it burned through $15 million and a management shakeup. Impressive for a company without a product after two years of trying with off-the-shelf technology from Inxight, a Xerox PARC spin out and now part of Business Objects, soon to be subsumed into SAP.

Some vendors let their customers do the selling. Fast Search & Transfer, a Norwegian search specialist, holds an annual search revival. The faithful attest to the power of the Fast ESP engine. The *ESP* means *Enterprise Search Platform*, not *Extrasensory Perception*, of course.

Some search vendors—one big U.K. outfit and one American company that has been chopped into smaller pieces in order to generate much-needed cash—have made sales by hiring well-known, high-profile individuals to endorse the companies' products. One of these celebrities evidenced too much enthusiasm, sparking allegations of improper conduct in procurement competitions.

Other vendors identify a problem with a particular search solution and develop an alternative. For example, there are more than 65 million Sharepoint seats in the world. Microsoft's Swiss Army knife content system comes with a free search system, but by all accounts, it is limp-wristed. Coveo has a snap-in solution that works. Bethesda, Maryland-based dtSearch has followed a similar path. Microsoft, a company continually challenged by search in all its varieties, is an ecosystem abdicating to a flourishing search ecosystem.

The roll call of search panaceas now includes social technology. Add it to statistical search, fielded search, and free text search. The net *net* is that social search can contribute to better results, but it is not a panacea. None of the present search systems is very good, in fact. Google proudly points to its dominance in search, but its world-renowned engineers have been working to develop systems that take the user's query as a clue. Algorithms determine what the user really wants and then gives that information to the user. Google plays down its Big Brother technologies, but not even Google's social voting, its high-speed data management systems, and its exhaustive user data can deliver information that works first time, every time.

Search is a very hard problem in computer science. It will remain a tough nut to crack for the foreseeable future.

The Information Universe I

In November 2007, a gentleman named Daniel P. Morse, DPM Technologies, Inc., gave a presentation named “Searching Absolutely Everything”.

Colloquial speech allows all to be used as a short hand way of saying, “Get me what's available about a topic.” All, a pesky categorical affirmative, does not mesh with current information retrieval systems. Consider this illustration of an information universe:

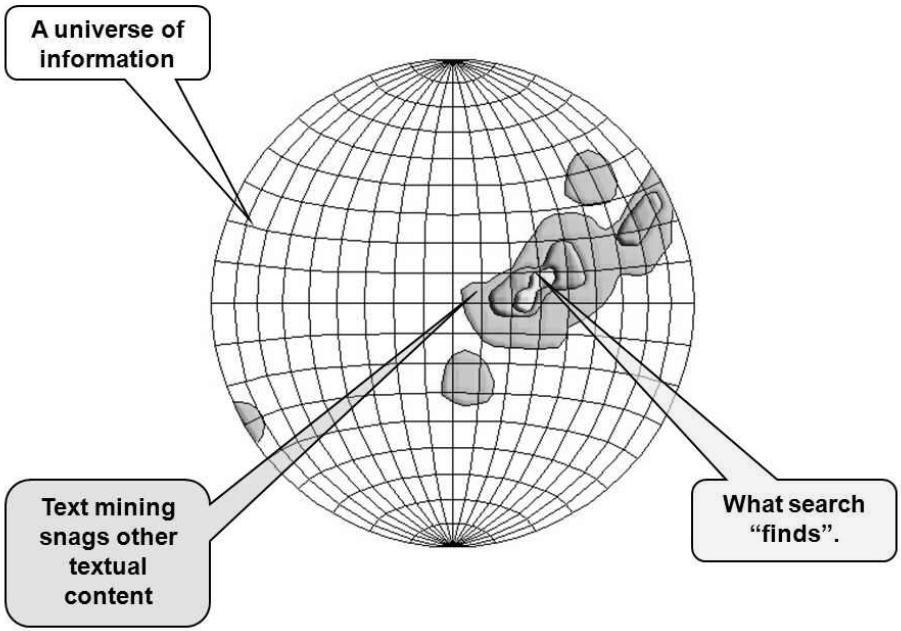

Figure 1: Searching the Universe of Information

The tinted areas represent the information that may be available to an organization or an individual user. The blank areas are the "there be dragons" unknowns. The information is either not available or it is unknown, which means that the user doesn't know where to look or how to frame the investigation. Text mining and its close cousin technologies can help a user discover information that might otherwise have been overlooked. Despite the petabytes of digital information that are available to a researcher today, vacuums exist. Making a decision based on available information is very different from making a decision based on all the data. Most people lack sound information judgment. Many managers look at some data and then guess. The popular view of guessing is playing a hunch or relying on instinct. In some situations, a guess may be good enough. In others, a guess flips open the lid on a digital Pandora's box.

The Information Universe II

Which system? In the Web world, Google snags upwards of 60 percent of the queries. Microsoft, Yahoo, and the dozens of other Web search engines divvy up the remaining percentage of queries.

But in the enterprise, the paws of Google have yet to stamp out the competition. Consider this list of search technology vendors. Keep in mind that each of these vendors offers different blends of algorithms, semantics, and social functions. The specifics of these systems is less important than answering this question, "Who are these guys?"

Acuity Software	IntelligenX (formerly i411)	QL2
Attensity	Introsspect	Radar Networks
Autonomy	Inxight (Business Objects)	Recommind
Bitext	Just Systems	Revelytix
Blossom Software	KNOW Inc	SAP
Caliph & Emir	Kanisa	SAS
Capitiva Software	Kennen Technologies	SLI Systems
Clarabridge	Knowledge Foundation	SPSS
ClearForest (now Reuters)	Kosmix	SRA International
Cognition Technologies	Lexalytics	SaltLux
Cogo Inc.	Lextek (possibly defunct)	Sandpiper Software
Contegra	Linguamatics	Saqqara
ContentScan	LinkSpace	SchemaLogic

Convera	Lucene	Scientgo
Coppereye	M2mi	Search Catcher
Correlate AS	Mitre Corp.	Semandex networks
Coveo	Megaputer	Semantic Insights
Cycorp	Mercado	Semantium
dtSearch	Microsoft	Semantra
Data Harmony	MindJet	Siderean
Dieselpoint	Mobius	Speed of Mind (Surf Ray)
EMonitor	Modus Operandi	Sphider
Endeca	Mondeca	Spotfire
Exalead	Mondosoft (in bankruptcy)	Stratify
Expert Maker	Muse Global	Sunrizen
Expert System	Northern Light	Swoogle
Facetmap	Notiora	Tableau
Fast Search & Transfer	Nstein	Temis
Flamenco	Ontomantics S.A.S	TeraText
Fourth Codex	Ontoprise GmbH	Tesuji
Gigaspaces	Ontos International AG	TextArc
Google	Ontotext Lab, Sirma GmbH	Thetus Corporation
Groxis	OpenText	Thunderstone
Hummingbird	Oracle	Top Quadrant

IBM (teaming with Yahoo)	Panoptic > Funnelback	Visual Knowledge
ISYS	Planet Search	Vivisimo
InQuira	Powerset	Web Side Story / Atomz
Inmon Data	Pragati Synergetic Research Inc.	XSB Inc.
Innerprise (GoDadday)	Progress Easy Ask	Zepheira
Integrity GmbH	Project 10x	Zylabs

Figure 2: Table of Search Vendors

A more difficult question for some is, "How will these companies differentiate themselves?" Or: "How will these companies generate enough revenue to survive?" Keep in mind that some search vendors hope to find a sugar daddy who buys them out. Others believe they are the next big thing, maybe the next Google.

Several conclusions may be tentatively asserted based on this list:

1. No single company has all the answers; otherwise, search would be like the automobile industry or the toothpaste market—a handful of vendors with three or four dominating the market, few new entrants, and most innovations limited to cosmetic and design changes
2. The names of the companies provide insight into what the core technology "under the hood" does; for example, semantics from Semandex Networks, Semantic Insights, Semantium, and Semantra, among others. Or, intelligent systems from Cognition Technologies, Inxight, Knowledge Foundation, and Nstein. Or, ontology-centric search from Ontomantics S.A.S, Ontoprise GmbH, Ontos International AG, Ontotext Lab, and

Sirma GmbH. Obviously there are very different conceptual and technical ways to approach search.

3. An organization wanting to license a search system for the first time to replace one that doesn't meet the organization's requirements has a big job ahead in order to figure out what system is "right" for them.

4. Social search has considerable appeal in certain situations. However appealing Facebook-like technology is to college students, it may send a shiver down the spine of a pharmaceutical company's security professional.

Little wonder that Google has asserted that information technology departments are facing a crisis. Users want more powerful system. Complexity rises as budgets come under greater pressure.

The day-to-day crisis mode of many IT departments makes it difficult for these professionals to tackle other, possibly more strategic information problems.

In our work for the first three editions of the *Enterprise Search Report,* we learned that some vendors' search systems have a mediocre track record. An errant search system, often without warning, can trigger cost overruns and create unexpected demands for additional hardware, bandwidth, or troubleshooting. Other findings include:

1. Most people who use online search, business intelligence, and commercial database services have no idea what's included in the data set queried, whether the retrieved information is right or wrong, or when the data were created, updated, and refreshed in the system.

2. The five or more search systems available to rank-and-file professionals in a Fortune 500 corporation are generally disliked and tolerated. Only when the system is non-functional and the costs sky rocket will senior managers take action. Their action? License another search system and grandfather the non-functional one because it's easier.

3. Work-arounds are plentiful. These range from paper files kept in offices to an underground and informal system that

ignores security procedures in order to keep the wheels of work processes turning.

Search without Search

In a sense, social search is search without search. It's the equivalent of asking someone for the answer to a math problem. On a larger scale, social search is a variant of Larry Page's PageRank algorithm. Humans click on links. Counting the clicks provides useful, valid data about preferences.

The diagram below provides a summary of the vector of change in search and retrieval. The original diagram came to me from SAS, who published one of my white papers on its Web site. I have made some important changes to the SAS original, and I have added two angled lines that reveal important information about search, regardless of its flavor. Note the column labeled "Data Warehouse." Digital archiving of structured data began decades ago. I've set the arbitrary date of 1995 to illustrate that data warehousing is a mature technology today. It has become a commodity due to the low cost of storage and wide diffusion of the ins and outs of the technology.

Keep in mind that the statistical tools used to extract information from a data warehouse are complex, and most people working with these repositories enjoy job security and good pay. But the $200 Windows Home Server and Mac's Time Machine are variants of data warehouses. In a few years, data warehouse technology will be subsumed into other functions.

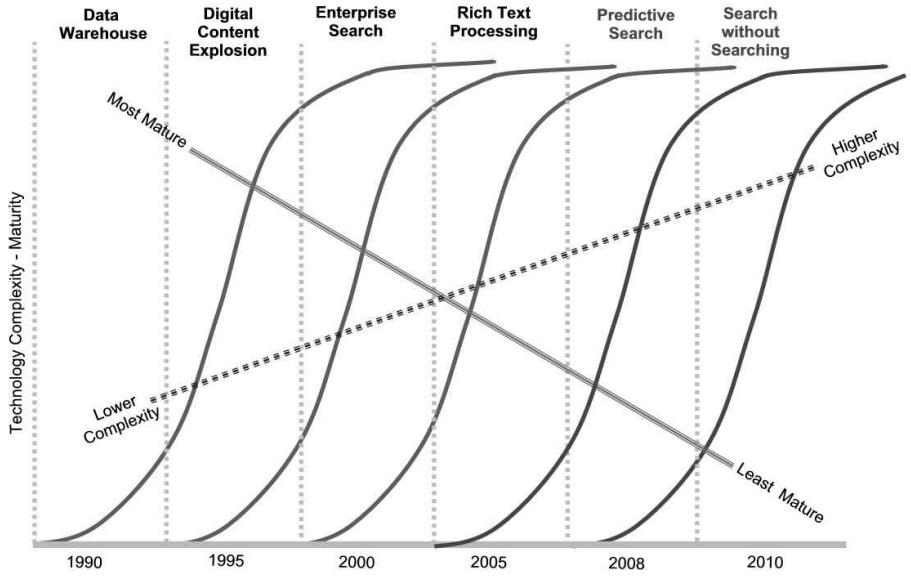

Figure 3: Variations on a Search Theme

The next three columns are Digital Content Explosion, Enterprise Search, and Rich Text Processing. Since the mid 1990s to the present, the revolution in search has been a reaction to the volume of digital content that is available. Each column represents a different wave of innovation designed to tame the digital content beasts rampaging wherever humans and computers meet.

First, there's the key word search sector's growth in the period from 2000 to 2005. Autonomy, Convera (formerly Excalibur), and Fast Search & Transfer were the "big three" in search. Major corporations licensed these six figure solutions. Endeca joined the fray, but that company remains a privately-held firm poised to take over the number two spot from Fast Search & Transfer. Convera has fallen by the wayside.

Second, esoteric technologies for squeezing meaning from text enjoyed an embarrassment of US government largess. Money flowed from In-Q-Tel and other government entities.

Not surprisingly, there are dozens of companies now pushing into the commercial sector. The uptake for some of these companies has been good; for example, Coveo, Exalead, ISYS, and Siderean have made significant gains against the "big three" as well as capturing accounts where a combination of search-and-retrieval and point-and-click interfaces allow a user to explore content by type, category, and other types of conceptual access points.

Third, we are now in the Rich Text Processing era. The need for discovery is a way to allow a user grasp a sense of what's available. The human is gifted at recognizing what it wants. The rich text processing technologies are designed to generate lists, facets, metaviews, and visualizations of content. As Vivisimo's founder Raul Valdes Peres told me, "People need information overlook."

The most interesting aspect of this diagram is the emergence of Predictive Search and the almost too good to be true notion of Search without Search. My former boss at Booz, Allen & Hamilton, Dr. William P. Sommers told me in 1981, "A manager wants to walk into his office and have the computer tell him what he needs to know today."

Companies like SAS, SPSS, and Cognos continue to capture customers and, interestingly enough, add various types of search and text processing features to their sophisticated statistical processes. The idea is that a user wants to "crunch" text and numbers, have those data processed by statistical routines, and then look at a report or "output" that "tells" the user what he or she needs to know. The next wave of innovation has already become somewhat apparent.

The Web search and advertising giant Google has filed a patent application for what it calls "I'm feeling doubly lucky". The idea is spot on with what users—both at work and at leisure want. The system delivers information without the user doing anything. The Google system, if it is representative of advanced search, knows the context of the user. The system queues up information based on user's past actions, the user's present location, and what other users who are similar to a specific user requires. The Google system then "pushes" this information to the user's mobile computing device or computer. The patent application describes this approach as "I'm feeling doubly lucky", presumably because the user doesn't have to do anything to get the information he or she requires.

Technology Maturity and Technology Complexity

Accept for a moment the timelines and the arbitrary trends in search. What I do want to focus on is that in the graphic there are two different lines running at angles to one another. One line shows the maturity of a particular technology at a point in time. So, data warehouse technology is more mature than enterprise search. The newer technologies in the chart are less mature. Less mature technologies are subject to change, may require expensive technical fixes, and can consume massive amounts of computing resources. Therefore, if one puts on an accountant's green eye shade, the conclusion is "New technologies are likely to pose more risk to a budget".

Now look at the other angled line. It's labeled "complexity". The data warehouse technology is less complex. Now keep in mind that because computers and software are involved, complexity is relative as I use the term. Notice that the newer technologies that predict or perform the Googley magic of "search without search" are hugely complex and, therefore, demand massive computational resources. At some point in the not too distant future, many organizations will not be able to run these next-generation systems themselves. Text processing or predictive utility services will run from a remote location. This "from the cloud" converts advanced text processing into a "pay as you go" service. The shift from locally-installed and maintained systems will be forced upon organizations for three reasons.

1. People. In the near future, computer and software professionals with the needed expertise will be in short supply and expensive. The education system will adapt, but that does little to solve a personnel problem in the short term.

2. Computer infrastructure. The chatter about "lights out" servers and drag-and-drop programming are significant innovations. But the skills needed to implement, maintain, and tune the high octane systems needed to advanced analytics may exhaust the Board of Directors', Wall Street's, and the chief financial officer's patience. It may be cheaper and more bottom line friendly to outsource next-generation information processing. Utility or cloud computing, therefore, may be unloved by some managers, but it may be forced upon staff by financial imperatives.

3. Fast-cycle software. Information technology organizations talk about change, but most IT professionals want stability and reliability. When advanced systems such as those for "search without search" become available, IT departments may dig in their heels and become overseers of advanced text processing that runs from the cloud. Make no mistake. Such professional outsourcing management is a big job, and it may be the only way to move an organization forward with certain advanced processes.

The demand for advanced text processing is real, and it is likely that exogenous factors will alter the landscape from what it has been since the 1990s. But in computing, the emergence of cloud solutions is little more than a return to the centralized mainframe concept reworked for the current generation of technology.

No Panaceas, Many Ploys

We have completed a major study of the search-and-retrieval requirements for the leading U.S. Government science agency. A look at the major findings is sobering:

- "I want a system that gives me the most relevant information from our in-house documents, Web content, and the third-party content we license from commercial sources." Note that this synthetic statement does not want semantics, linguistics, or visualization. The statement expresses a desire to run one query and have access to pertinent information from different, geographically dispersed sources. Delivering this type of key word search functionality is not trivial but it can be done with systems that federate or give the impression that the multiple content domains are known to one search system. The results can be winnowed so the most relevant appear in the results list.
- "I want a system that responds quickly just like search systems for the Web." Note that this is not a search technology problem. Poor performance is almost always a result of hardware, software, and infrastructure issues. Money and engineering can address most performance problems. But when the funds are not available, the search system won't work very well. One US government system could index only 17 million

documents out of a pool of 40 million. Without money to address infrastructure and engineering problems, the advanced system wasn't much good for search. More than half of the information wasn't available to the system.

- "I want to see the information and have a search box and some type of point-and-click display so I can find what I need my way." Note that this is an interface issue. It can be resolved by indexing content by entities (people, places, and things), concepts, and relevant terms from a classification system. An interface alone won't solve the problem. And, having large amounts of metadata attached to each document won't improve search unless the needed content have been transformed so the rich text processing system operate.

No system available today can deliver on these needs. The charm of Moore's Law doesn't change one fact about computer systems. Upgrading a system is expensive and when done improperly, the upgrade can gobble available cash. In an organization, scaling is slow and expensive. More important, however, is the assumption on the part of most IT professionals that search's computational demands are not a problem. When a hot spot brings a search system to its knees or the accounting department cannot process the payroll, the easiest fix is to turn off the search systems' processes.

Remember that it is difficult to find mission critical information when the data aren't in the system, when the system is not responding, or when the system's resource hogs have been disabled. How common is this problem? In our work, we learned that more than two thirds of the Fortune 500 companies we surveyed have experienced infrastructure issues and taken Draconian steps to get the affected systems up and running. Search, a problem in the first place, is often scarified to other, higher priority functions.

The good news is that competitive intelligence is improving, albeit slowly. The wide diffusion of advanced text processing tools and the ready availability of digital content provide the raw material needed to extract intelligence from information. There will be the inevitable stop-and-go progress. At some point in the future, systems, information, and users will come happily together. Our efforts are making this "better world" a reality, so we can tackle the problems that demand resolution.

World Brain as EarthGame™[1]

Robert Steele[2]

The recent identification by the United Nations High-Level Threat Panel of the ten high-level threats to humanity, listed below, is most helpful in identifying the related underlying symptoms of global collapse.

Poverty	Genocide
Infectious Disease	Other Atrocities
Environmental Degradation	Proliferation
Inter-State Conflict	Terrorism
Civil War	Transnational Crime

Figure 1: Ten High-Level Threats to Humanity[3]

As J. F. Rischard puts it in his book *HIGH NOON: 20 Global Problems, 20 Years to Solve Them* (2003), We the People are moving away from hierarchies at the same time that nation-states are struggling (many collapsing), and the lines are blurring among public and private sector enterprises. Nation-states, the most complex of enterprises, are collapsing and turning disasters like Katrina into catastrophes for lack of a proper decision support process and adaptive

[1] EarthGame™ is a trademark registered by Medard Gabel, who helped create the analog World Game with Buckminster Fuller, and is a co-founder of the Earth Intelligence Network, where he will oversee the creation of a digital EarthGame™.

[2] The author is one of twenty-four co-founders of the Earth Intelligence Network (EIN), a non-profit coalition that provides public intelligence in the public interest to all forms of organization, and to eventually organize 100 million volunteers able to teach the five billion poor "one cell call at a time. A recovering spy, he has spent the last twenty years as the leading international proponent for Open Source Intelligence (OSINT) and is in passing the #1 Amazon reviewer for non-fiction (#38 over-all as of 18 Feb 08).

[3] LtGen Brent Scowcroft, USA (Ret), et al. *A More Secure World: Our Shared Responsibility* (2004).

capabilities that can respond quickly to unanticipated challenges. Indeed, Joseph Tainter in *The Collapse of Complex Societies* (1988) teaches us that as societies become more complex, their ability to manage details from the top down becomes overly expensive and less and less effective; Henry Kissinger, in *Does American Need a Foreign Policy?* (2004) notes that politics has failed to keep up with globalization and new forms of communication; and there are no fewer than twenty-seven (27) secessionist movements in the United States of America, and six secessionist movements in Canada (as well as hundreds elsewhere around the world).[4] Meanwhile, under the Bush-Cheney regime, failed states have multiplied dramatically, with the United States of America itself no longer in the Sustainable category, but falling to being of moderate concern.[5]

Put most simply, the traditional concept of bureaucracy as a means for administering complex organizations, the heart of the public administration paradigm, has failed. At the same time, the Internet and the cellular telephone have made possible completely new forms of collective action in acquiring, making sense of and sharing information. We are in crisis, in an intermediate period where political entities are failing; non-governmental organizations and social networks are emergent, and the majority of individuals have not yet chosen to become active participants in any of a number of collective intelligence enterprises, while a small minority are heavily engaged across a wide variety of networks that dilute the energy of individuals while not yet achieving synergy across divergent activist movements.

Smart Mobs, Information Sharing & Decision Support

The traditional paradigm for governance has relied on top-down or "elite" decision-making, generally behind closed doors and often in a climate of secrecy. This is consistent with the Weberian concept of bureaucracy as a means of pigeon-holding knowledge. Now a new paradigm is emerging, on that combines the power of collectives as discussed in *World Café*, *Smart Mobs*, *The Tao of Democracy*, *An Army of Davids*, *The Change Handbook*, *Infotopia*, *Crashing the Gate*, and *Society's Breakthrough*; and the power of

[4] Two other compelling works are Jared Diamond's *COLLAPSE: How Societies Choose to Fail or Succeed* (2005); and an edited work, *Catastrophe & Culture: The Anthropology of Disaster* (2002)

[5] The Fund for Peace, Failed States Index 2007, as viewed 15 January 2007.

information to create *Infinite Wealth*, Thomas Stewart, the *Wealth of Knowledge*, Alvin & Heidi Toffler, *Wealth, Yochai* Benkler, the *Wealth of Networks*, and most recently, Howard Gardner, *Five Mind for the Futures* and Keith Sawyer, *Group Genius: The Creative Power of Collaboration* as well as Richard Ogle, *Smart World: Breakthrough Creativity and the New Science of Ideas*. Each of these is the title of a book that adds to our understanding of the fact that information can be shared without losing value, and indeed gaining in value and creating new wealth as it is shared. This changes the balance of power between elites and the public. In the face of vast quantities of information, the ability of the elites to process and make sense of information declines sharply, while the ability of the public rises dramatically—as the LINUX pioneers like to say, "Put enough eyes on it and no bug is invisible."[6] The latter idea is developed in H. G. Wells, *World Brain* (1932); Pierre Levy, *Collective Intelligence* (1997), Howard Bloom, *Global Brain* .(2000); and Dee Hock, *One From Many* (2005).[7]

Mandates for Change: Isolating the Key Policy Domains

Identifying and appreciating the high-level threats to our collective humanity is but the beginning. There have been two obstacles to coherent collective action in the past: the isolation of each of the policy domains, each dominated by a distinct group of stakeholders with no over-arching authority able to demand the harmonization of policies; and a lack of shared information or a common view of the totality of the systemic architecture and how policies and expenditures in one domain impact on all others.

Recently the author studied the various "mandate for change" volumes that precede any general election for President in the United States, and identified twelve policy domains where budgets and behaviors must be harmonized.

Agriculture	Diplomacy	Education	Energy	Family
Health	Immigration	Security	Society	Water

Figure 2: Twelve Key Policy Domains Requiring Harmonization

[6] My various books address how the proven process of intelligence can create public intelligence in the public interest. See also 750 presenters at www.oss.net in Archives.
[7] I choose not to get into the concept of memes here, but have great respect for Richard Dawkins, Robert Auger and the many others that have sought to develop that discipline.

By identifying these, and combining them in a matrix with the ten high-level threats to humanity, it becomes possible to acquire, process, and present relevant information, including budgetary information, showing both the costs of the ten high-level threats to each community; and the cost-benefit tradeoffs of specific investments in specific policy domain areas.

It now becomes possible to see that subsidizing agriculture in the USA creates poverty in Third World countries suited only for agricultural production, while also consuming water that is increasingly scarce as the US aquifers drop a meter each year. It becomes possible to see that each gallon of ethanol fuel created consumes 1,700 gallons of water in the growing and processing.

Information in Historical and Future Context

Information that was once known but not recognized—*Fog Facts*—can now be shared, understood, and acted upon by collectives that previously delegated decision-making to an elite. Information that was once concealed, censored, or manipulated, is now being discovered and placed before the public—witness *Lost History*, or *Someone Would Have Talked*. One has only to look at the wealth of the literature—and the DVDs—on 9-11 to see that the information environment has changed radically in favor of We the People. Our digital memory will recover history, inform the present, and illuminate the future. However, memory is not enough. We need a process—a tool—that everyone can use, that is firmly founded in reality, is able to place all the relevant facts before an infinite audience of diverse stakeholders, and also allows for the clear visualization of alternative scenarios, their costs in the near to long term, and their benefits in the near to long term. Above all, this process must represent what Stewart Brand has called *The Clock of the Long Now* (2000), and it must allow every individual, every collective, to understand *The State of the Future* in terms that are meaningful and actionable.

Irrelevance of Europe and the United States of America

Before going on to describe the Earth Intelligence Network process that will support the EarthGame™ and make a World Brain possible (i.e. not just a network of nodes, but a network that can ask questions and make decisions as a collective, at every level in every language on every topic), it is important to emphasize that nothing that Europe or the United States of America do will matter *unless* we create a model so compelling that it is immediately adopted

by the eight major players who will in the aggregate define the future of the Earth and the fate of Humanity. They are listed below.

Brazil	Iran
China	Russia
India	Venezuela
Indonesia	Wild Cards

Figure 3: Eight Major Players (Demographic Giants & Wild Cards)

Strategic Intention

The illustration below says it all—we must start with reality and end with peace and prosperity for all.

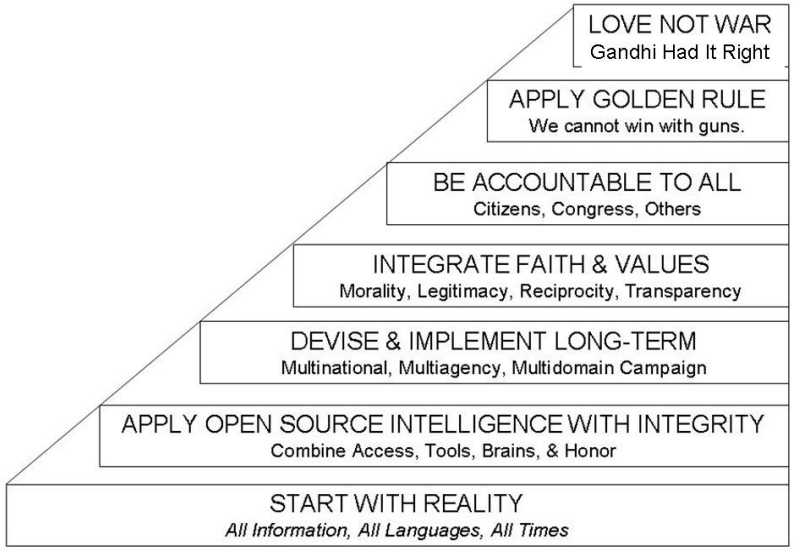

Figure 4: Strategic Intention for a World Brain

Operational Intention

At the operational level, which concerns itself with campaign plans and the harmonization of disparate endeavors to achieve commons ends, we have found that the single most important obstacle to coordinated action is a lack of a common visualization of the operational "terrain" (be it a challenge such as poverty, or a province where multiple challenges are to be found); and, conversely, that the single fastest and cheapest way to rapidly accelerate and enhance voluntary coordinated action, is through information sharing and an inclusive decision support process. The 24 co-founders of the Earth Intelligence created the operational approach illustrated below, with a view to making the EarthGame™ a tool, a service of common concern, for all mankind and all collectives—in makes precision giving possible.

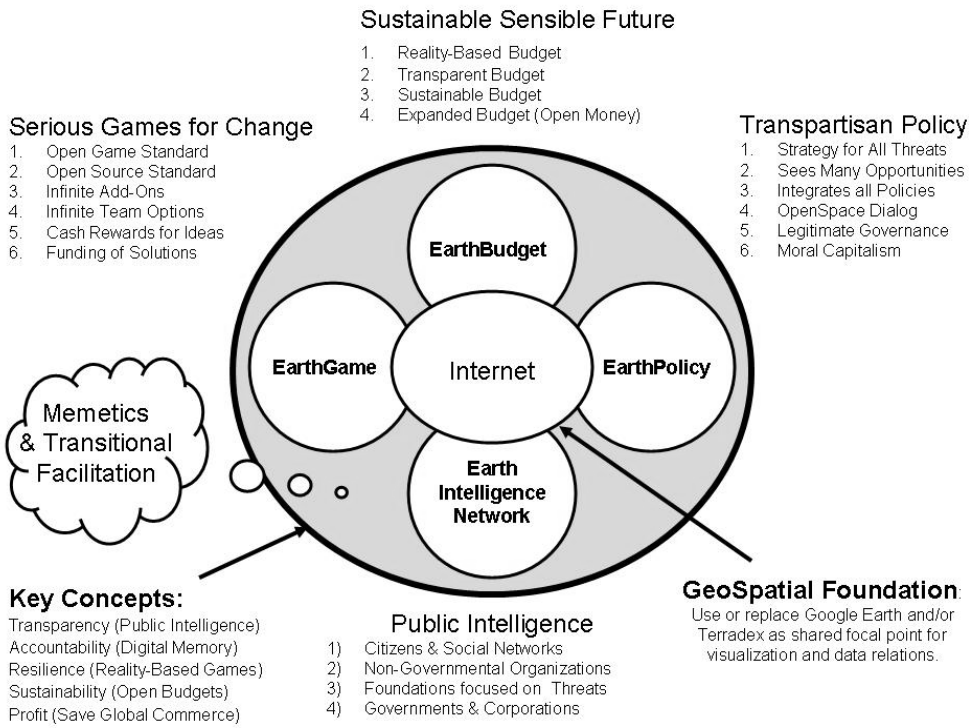

Figure 5: Operational Concept for Internet-Based Global EarthGame™

The EarthGame™

The digital EarthGame™, to be designed and implemented under the leadership of Medard Gabel,[8] who co-created the analog World Game with Buckminster Fuller, is:

- An online global problem-solving tool accessible to anyone in the world with Internet access where sustainable and affordable solutions to real world problems are envisioned, developed, costed out in all respects, and tested so they can be implemented as soon as possible.
- An online tool and game that provides "ordinary" people the opportunity and challenge of addressing real world problems in a way that builds knowledge, competency, and options for real world implementation.
- An experiential, interactive, and fun way of learning about the world, its resources, problems, and options that builds global capacity and alternatives for sustainable prosperity.

  Our intent is to honor the vision of Buckminster Fuller:

  "To make the world work for 100% of humanity, in the shortest possible time, with present day resources and technology, through spontaneous cooperation, without ecological harm or the disadvantage of anyone."

The world needs to see itself, across threats, opportunities, policies, and budgets, at all levels. As a planetary species, humanity needs a tool for seeing the whole, for connecting the dots, seeing patterns and large scale trends, and most importantly, recognizing, defining and solving its most pressing problems in a global context. Nearly all of the world's most critical problems are global in scope and have been made increasingly dangerous by a piecemeal local approach that ignores interconnections and its resultant synergy. EarthGame™, by allowing all to see the all budgets in a planetary perspective, will inspire wise collective decisions that were heretofore unattainable.[9]

[8] www.bigpicturtesmallworld.com

[9] Real-time science is needed because changes to the Earth that used to take 10,000 years now take three. EarthGame™ *is* the Operating Manual for Spaceship Earth.

Supporting the EarthGame™

Three institutes comprise the operational level of the Earth Intelligence Network, which is the parent and a 501c3 from 12 January 2007::

- Earth Intelligence Network (EIN). This network of activists and experts on each of the ten threats, twelve policies, and eight challengers will use funds solicited from foundations, governments, and corporations, to create public intelligence in the public interest.
- Transpartisan Policy Institute (TPI). Under the leadership of James Turner, Esquire[10] this institute will harness the distributed knowledge of experts and practitioners as well as citizen end-users to identify a wide variety of policies and their projected outcomes, for inclusion in the EarthGame™,
- Public Budget Office (PBO). Under the leadership of Mr. Arnold Donahue, recently retired Senior Executive Service (SES) of the Office of Management and Budget (OMB), this office will facilitate the loading of all budgets into an online framework that can be exploited by the EarthGame™, and will nurture Open Space dialogs about budget trade-offs in relations to the facts as they can be known, and the future as it can be forecast on the basis of alternative investment scenarios.

Other elements in support of the EarthGame™ include the Open Money project, an essential enabler for collective enterprise free of the debt and related handicaps associated with the existing monetary system that thrives on scarcity; the Memetics and Open Spectrum project that seeks to facilitate a global conversation while also promulgating standards and methods helpful to the achievement of Open Spectrum;[11] and a Transpartisan People's Trust collecting micro-cash money in order to bury conventional political parties[12] and enable both honest democracy and micro-giving to the five billion poor.

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[10] Ralph Nader's first partner, today a principal in Swankin & Turner, a law firm specializing in health and food industry standards, and co-developer of the concept of transpartisanship, a concept that subordinates political affiliations to the public interest.

[11] Open Spectrum leads very quickly to the promulgation of smart devices that make better use of all available spectrum. See David Weinberger's contribution in this book, from page 445.

[12] All of our institutions are broken. See my lists and reviews at Amazon.

Tactical Intention

Our tactical intention can be described in three phases.

- Phase 1. Connect the United Nations System, the Foundations spending money on the high-level threats to humanity, and the emerging Civil Affairs and "white hat" capabilities of the Pentagon. We do this through an annual conference with the intent of creating a validated global spending plan that the United Nations can share with all the foundations in order to enhance the impact of the aggregate funds as they are spent in the context of a harmonized global "virtual" budget for peace.
- Phase 2. Assist and leverage a Multinational Decision Support Center (MDSC) in Tampa, Florida, in support of the new Office of the Assistant Secretary General (ASG) of the United Nations for Decision Support; and also the new Department of State (DoS) Office for Information Sharing Treaties and Agreements (IST&A), as well as the Foundations.
- Phase 3. Attract sufficient funding to manage a global program to recruit volunteers or subsidized contract teachers—100 million in number—each able to offer Internet access and educational tutoring to the five billion poor, "one cell call at a time." Educating the five billion poor "on the fly" is in our view the single fastest means of creating infinite stabilizing wealth in every clime and place. In conjunction with the widespread use of Open Money, we anticipate a relatively rapid single-generation leap forward in which those in extreme poverty triple their income from 1-2 dollars a day to 3-6 dollars a day. Helping to achieve that change is our "home run."

Financial Intention

Public intelligence is the antithesis of secret intelligence and secret power. Public intelligence can dramatically improve the transparency of public budgets, and since the budget *is* the policy, it can illuminate for the public what the *real* policies are, as opposed to the platitudes offered by politicians. By focusing very explicitly on budgets, and making it possible for all budgets to be loaded into the EarthGame™, it is our hope that we will provide the citizens of

each jurisdiction with a means of eliminating fraud, waste, and abuse—and of course corruption—by subjecting every public transaction to public scrutiny before it is executed. We do, however, have a much larger vision for how the EarthGame™ can proactively influence up to $3 trillion a year in expenditures that here-to-fore have been uncoordinated and executed in isolation from one another. Here is Medard Gabel's alternative spending plan for just one third on what is now spent on war.[13] EarthGame can serve as a virtual Global Range of Gifts Table that all organizations and individual donors can use to opt in as the responsible party for specific needs from $10 to $10 billion.

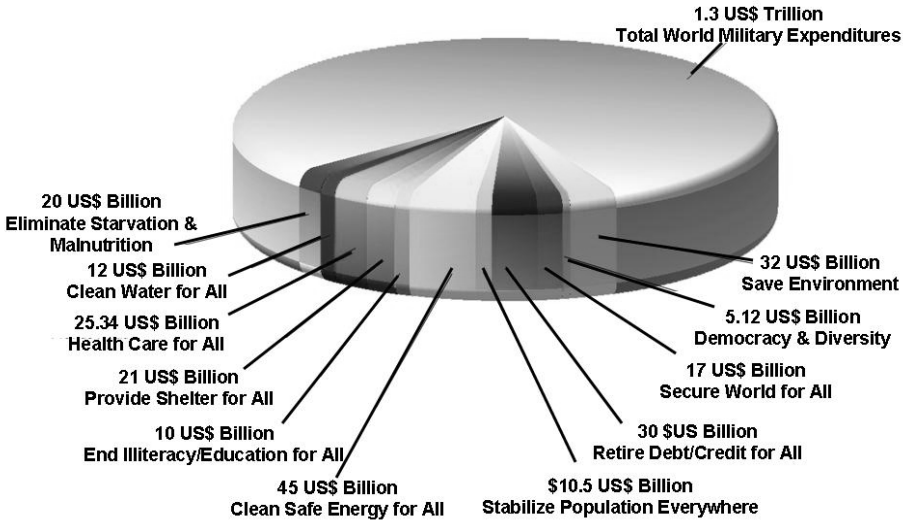

Figure 6: The Opportunity Cost of War: Peace & Prosperity for All

Political Intention: *E Veritate Potens* – With Truth, We the People Are Empowered. We will create public intelligence in the public interest. We will create a prosperous world at peace.

[13] His forthcoming book, *Seven Billion Billionaires*, will spell out the details.

The Interra Project: consumer dollars as collective goods

Jon Ramer[1]

What kind of world do we want?

Along with other leaders of the social and environmental business movement, Greg Steltenpohl, founder of Odwalla Juices, and Dee Hock, founder of VISA International, share a deep concern about our dwindling natural resources, human-caused climate change, and resulting political and ecological consequences.

By harnessing consumer power, 70% of U.S. GDP, Greg, Dee, and other concerned leaders believe that we can make systemic change happen. Change that could:

- Stabilize the effects of climate change;
- Dramatically reduce human need for natural resources; and
- Restore our local and global communities.

To make this vision a reality, Greg and Dee have assembled a diverse team of social entrepreneurs with business and technical skills and proven track records to create Interra.

Our vision derives from four beliefs:

- Our consumer lifestyle is the driving force behind the growing destruction of social and ecological systems.
- Vibrant communities are created and organized by the citizens who live and participate in them.

[1] Jon Ramer, a musician at heart, is a co-founder of Interra, WISER (World Index of Social and Environmental Responsibility), and Earth Intelligence Network.

- By influencing the economic choices people make, and harnessing that spending power, together, we can transform how business is conducted.
- Systemic change is needed. To enable it, we, at Interra, believe that a new model for social commerce is required. We call it "restorative commerce."

In this model, business is transacted in a way that re-circulates sales proceeds within a community to benefit all of its stakeholders: citizens, nonprofits, businesses, and natural ecosystems. The force of increasingly empowered consumers drives the model; and the model attracts citizens by giving them substantial reason to participate, both for their personal benefit and that of their community.

The Interra model is based on a simple, purchasing-based platform that intelligently bundles open source technologies for community cooperation and empowerment. It works with any form of payment at the POS and online, promotes education and awareness of restorative options, drives community loyalty, and supports community causes—all with a simple swipe of a card or click of a mouse.

Consumer power: a vicious cycle can become virtuous

Americans lead the world in consumption, making the majority of their purchases from profit-driven multinational corporations focused almost solely on cost reductions, with little regard for people or the environment. Our current consumption patterns affect our health, economy, society, local communities, and our planet.

Generally, U.S. consumers do not connect their lifestyle choices with the destructive impact of their consumption. And because most alternative lifestyle products are not readily available, average consumers are not aware that they have the power to reverse these impacts.

At the same time a growing number of consumers—50 million in the U.S.[2]—are seeking products in every part of their lives that enable them to live their social and environmental values. Yet they live within a constant paradox: the need to make lifestyle choices based on time, convenience, availability, and

[2] www.lohas.com

economic constraints, and the desire to support their health and that of their surrounding community. Major corporate manufacturers and merchants like Ford, Nike, Toyota, and Whole Foods are capitalizing on this growing movement of conscious consumerism, as are numerous small, locally owned businesses.

What this movement has lacked is a way to cohesively tie together the civic, nonprofit, and business sectors in a way that makes conscious consumerism and responsible business easily accessible and a systemic part of everyday life.

Interra's model resolves this issue for all stakeholders providing economic value to merchants and consumers alike for making choices that benefit communities and each other.

Building on a movement

Interra will build on the success of the LOHAS industry (Lifestyles of Health and Sustainability) fueled by its primary driver: 50 million people and the quickly growing consumer segment, the "Cultural Creatives." Cultural Creatives are looking to live their social and environmental values in all of their daily decisions. LOHAS currently represents more than 1/3 of the U.S. adult population, who purchase $230 billion[3] in restorative, community-friendly products and services.

The most important psychographic motivator for Cultural Creatives is health and well-being for their family, community, and planet, making them Interra's core target.

Current vehicles for change are not enough to meet the needs and desires of Cultural Creatives nor the growing base of other concerned consumers. The public is increasingly dissatisfied with the ability of our institutions to solve the problems plaguing our society and environment. Non-profit organizations, social institutions, and governmental agencies can do good work, but are constrained by a lack of resources.

[3] www.lohas.com

Introducing Interra

Interra provides the means for consumers to meet their needs, live their values, and benefit their communities—with the convenience and ease of using their existing payment instruments. Interra is a social benefit system that:

- **Brings together** the civic, nonprofit, and business sectors and enables them to leverage the power of the consumer dollar to reverse negative social and environmental trends;
- **Simplifies** restorative living by making alternatives easily available through an on-and off-line directory of local and national merchants;
- **Rewards** consumers for buying from restorative manufacturers and merchants;
- **Donates** dollars to local nonprofits and social service providers creating a reliable source of funding for nonprofits;
- **Leverages** existing payment card networks (which 88% of adults currently use), open social networking technologies, and loyalty program know-how; and
- **Provides** real-time feedback to consumers and communities about the difference their choices make, while sending a clear signal to the market by aggregating consumer data.

In sum: Interra provides the tools and incentives for consumers to vote with their dollars for a new kind of marketplace that supports local economies, community culture, and the environment. Through its fair share of transaction revenues Interra will be capable of self-funding as it scales its impact.

Interra's target market

Interra's market includes several segments of a community: consumers, local businesses and community alliances, nonprofits, and manufacturers of sustainable products, all of which benefit from Interra's offering.

Consumers

Our consumer strategy has two parts:

1. Engage progressive consumers: Capture and fuel the growth of the LOHAS market by making it easier for like-minded consumers and companies to connect and engage in business.
2. Engage the mainstream: Provide the framework and tools for the growing number of community alliances forming around the world working to preserve their local economies and cultures.

Sustainable businesses and community alliances

Independent businesses are struggling for survival as the many "big box" retailers move into their communities with sophisticated CRM systems and lower prices. Forward-thinking community alliances are forming to support local businesses through customer loyalty and other community based programs.

However, these alliances need a complete set of tools for making these programs truly successful. Interra provides community alliances and sustainable businesses with an affordable back end system, locally issued Community Cards, online Interra Bot, and the community loyalty tools they need to fuel a vibrant economy and, in aggregate, give big box retailers a run for their money.

Interra will implement community loyalty programs at the point of sale and online with local and national merchants, promote those local businesses through a directory and social marketing campaign, and issue Community Cards to neighborhood residents.

As we scale, local businesses and community alliance programs will also feed into a national Interra meta-directory of locally-owned businesses that locals and travelers alike can easily find, support, and be rewarded by. A simple community based rating system will enable the best manufacturers and retailers to rise to the top and gain the most visibility.

Local and national nonprofits

Interra has relationships with many well-known national nonprofit brands that are eager to develop affinity card marketing programs —a great way for Interra

to aggregate millions of consumers whose every purchase benefits their favorite nonprofit. Community alliances can also nominate local nonprofits to benefit from local consumers' and visitors' purchases as well as merchant donations.

Socially and environmentally-minded manufacturers

Interra will leverage and aggregate existing directories of like-minded businesses and products, providing broad market access for manufacturers and creating a powerful resource for consumers to find and support sustainable companies.

How Interra works

Interra's primary interactions are with representatives of community alliances. We offer alliance partners a self-funding solution with two major deliverables:

1. Membership program and Community Cards and online Bot, which facilitates the rewards, donations, and criteria for merchants and beneficiaries
2. A community information commons that uses open source software which enable communities to create their own combination of content management, community mapping, social networking, "wikis", directories, etc.

Interra has in place a template project plan to facilitate work with communities. The main areas of activity are: program design, merchant enrollment, card production and distribution, and community marketing. Each community program will be co-branded with Interra, but distinct. Program specifics will be decided locally and Interra will provide the common operating system that links the cards, online Bot and community programs together.

With new funding, Interra will rapidly roll out its offering to community alliances, merchants, consumers, and nonprofits. Below are some highlights of our plan.

For Interra cardholders we:

- Publish and provide access to a network of directory publishers and merchants so that as consumers travel from city to city, they can immediately localize themselves, finding like-minded merchants who also reward them for their patronage;

- Provide merchant location information and special offerings on their cell phones or PDAs;
- Provide a choice of local or national nonprofits to benefit from their purchases anywhere in the country as long as they use their Community Card at participating Interra merchants;
- Register their existing credit or debit cards in the Interra system, or apply for an Interra co-branded Visa or Mastercard, issued by a local bank, enabling them to reap additional rewards for the nonprofit of their choice;
- Provide third party ratings and reviews of businesses using criteria related to overall excellence, social values, environmental performance, and local ownership; and
- Provide real feedback on the local economic footprint and global impact of their purchases—e.g., how they have helped CO_2 levels drop, conserved resources, or enabled a school to be built.

For Interra merchants we:

- Increase access, visibility, and sales through community based marketing programs;
- Provide a direct connection to specifically targeted customers within the Interra network, to whom they can provide discounts, rebates, coupons and other incentives;
- Provide valuable market data on consumer trends, needs, and desires;
- Share state of the art tools and practices for rewarding customer loyalty; and
- Decrease costs through wholesale buying cooperatives.

Now is the time for Interra

The market is ready. With the release of Al Gore's movie "An Inconvenient Truth" there are new opportunities for sustainable thinking to become mainstream. In addition to the over 50 million consumers already spending

more than $230 billion on restorative goods and services, communities throughout the country have begun to organize alliances to preserve the vitality of their neighborhoods and local economies. Companies have demonstrated that they do respond to consumer demand for more responsible products and practices, and many have begun to redefine their own standards to increase differentiation. *Interra can accelerate the process.*

Local economies need the tools. By providing small businesses—many of whom lack customer attraction and retention tools—with a powerful, federated CRM (Customer Relationship Management) system, they can fuel customer loyalty, get valuable data to improve sales, and be recognized as part of an important movement. *By helping to keep small businesses alive, Interra helps local communities preserve their economies and culture.*

The technologies are proven and affordable. Use of electronic payment cards is nearly universal and still on the rise. Affinity cards have demonstrated that consumers are more likely to choose a card aligned with something they care about. Loyalty programs have demonstrated that consumers are motivated by incentives. Additionally, and perhaps more important, when companies deliver a blend of "soft benefits," such as recognizing a customer's preferences or creating a relationship, the experience feels more personalized and customers become increasingly loyal. Loyalty programs at HP, Rain Bird, Huggies, and many others serve as prime examples of the benefits to companies. Network technology has enabled many-to-many connections, and demonstrated the vast potential power in aggregating individual action. *By leveraging these tools, Interra can build a movement like never before.*

Progress to date

Interra is piloting programs in Boston, Puget Sound, and Vancouver and has identified additional programs to be launched in the next 12 months.

Current pilots include:

- The Boston Main Streets Boston Community Change Card.
- The Puget Sound Community Card.
- Roots of Change Fund.
- The Evolver Project.
- BALLE (Business Alliance for Local Living Economies):

- Berkman Center for Internet and Society at Harvard Law School:

To enable community implementation, Interra has established working relationships with a number of providers and partners, including:

- Nietech Payment Technology Company:
- The Institute for the Future, Howard Rheingold, and the Cooperation Future Commons:
- MediaVenture Collective

The potential impact is enormous.

How will Interra scale?

As more people wake up to the issues their communities face, the conscious consumer movement will continue to grow. We believe Interra has the ability to speed up the process, making it easier for mainstream citizens to take action and collectively make a difference in their communities and in the world.

Interra will scale quickly and naturally through:

- Partnerships.
- Self-organizing networks.
- Hybrid structures.

What will it take?

Ready to scale. Interra has learned from our pilot communities how to architect a versatile and robust social networking and transaction platform that supports specific community needs. It has selected vendors, established partnerships across the business and nonprofit worlds, and begun to build local teams.

Interra is seeking funding and has a business plan available for discussion. Donors that make leadership gifts in the launch round can also invest in the for-profit entities as they are created.

Imagine a world in which living standards are improving while we consume fewer resources, and citizens are engaged in furthering the health of our communities and global society.

I**nterra will help make it happen.**

We hope you will join us.[4]

[4] Learn more at http://www.interraproject.org. A complete business plan is available from Jon Ramer at jramer [at] interraproject.org or by calling 206.526.2323.

From corporate responsibility to Backstory management

Alex Steffen[1]

There was a time, not all that long ago, when a company's responsibilities stopped at the office door.

Those days are over. As connectivity increases and activists grow more savvy about forcing transparency in the sourcing of goods (think, for instance, of the blood diamonds campaign or the use of cell phones to reveal the origins of food), William Gibson's prophetic remarks on accountability ring more true every day:

"It is becoming unprecedentedly difficult for anyone, anyone at all, to keep a secret. In the age of the leak and the blog, of evidence extraction and link discovery, truths will either out or be outed, later if not sooner. This is something I would bring to the attention of every diplomat, politician and corporate leader: the future, eventually, will find you out. The future... will have its way with you. In the end, you will be seen to have done that which you did."

The practical manifestation of this trend is that everything matters. Where once a company was held accountable for what it did, it is increasingly held accountable for that which it caused to happen. As the consulting outfit SustainAbility puts it in their report, *The Changing Landscape of Liability*, "boundaries of accountability will progressively expand through the value chain and through the whole life-cycle of a product's development, production, use and disposal."

A company's suppliers matter. Those suppliers' subcontractors matter. The labor standards of everyone who had any part in making the product matter. The materials in the product matter. The energy used to make it matters. The

[1]Alex Steffen, Executive Editor, WorldChanging.com.

manufacturing process itself matters, as does the producer's plan for the disposal of the product when it's over. Indeed, as far as corporate reputations are concerned, accountability is becoming a vast web of entanglements in the actions of others, some of whom the leaders of that corporation might be hard-pressed to name.

This is something new, and powerful. We already have an increasingly effective global NGO movement aimed at forcing whole classes of businesses into compliance with certification systems (think FSC timber, fair trade coffee, etc.). In his excellent book *Branded!: How the 'certification revolution' is transforming global capitalism*, Michael Conroy notes that a whole array of industries are now coming into compliance with third-party accountability systems that certify whether or not that company's actions meet basic environmental and social standards. It's not just coffee and chocolate anymore, but also mining, banking, apparel, chemicals and so on. If you're in business, you can be sure that someone somewhere has a certification system with your name on it.

But in this new phase, it is not enough simply to stop being evil. As *Marks & Spencer* executive Ed Williams said, "consumers increasingly want to be sure that the companies they deal with reflect their values, can be trusted to behave responsibly, are who they say they are and are the kind of organization they like to be associated with." In simpler terms, companies are finding themselves held responsible for the whole backstory of their products.

A product's backstory, you'll remember, is everything that happened to get the object or service to us, everything that will happen behind the scenes while we use it, and everything that will happen after it leaves our lives. The backstory tells us who we're being when we make a choice.

Good companies are getting better at telling the backstories of the things they make. Other companies—the ones who can't figure out how to tell their backstories, or whose backstories are shameful—are sailing into the storm. Indeed, how companies tell their backstories is the critical business communication challenge of the next decade. We're entering an era of holistic accountability and backstory management.

So far, attempts at creating tools for telling backstories have been mostly unsuccessful.

One reason for this is complexity: the backstories of even simple products often link together a staggering array of people, places and things.

Another difficulty in backstory communication has been the lack of clear targets. Effectively revealing your backstory conveys explicit goals about the kind of company you're trying to be, and it is still difficult to know what the gold standard is for any particular product or service: What does a sustainable shoe look like? How does a responsible masonry supply chain operate?

There are some practices smart companies should definitely avoid. Lying is obviously at the top of the list, but not much farther down the list is trying obscure negatives by emphasizing the positive—even when this doesn't devolve into outright greenwashing, it risks being seen as such. But neither will vague goals help much.

Vague goals are dangerous because they're clueless. Consumers and investors both want effectiveness, and at a time when cluelessness about sustainability equals liability, to display muddle-headed thinking is to send a message that you are not entirely worthy of their trust.

A well-intentioned example of flawed goal-setting is the site Actics, which means to help individual and institutional members turn values into action, but which assigns no absolute value to the goals towards which the action aims, thus making the whole site rather wishy-washy. For instance, the most popular action on the site is “Have an interest in and concern for ideas, opinions, practices, etc., foreign to one's own; a liberal, undogmatic viewpoint.” To say that this leaves some wiggle room for irresponsible behavior would be an understatement.

In contrast, the path to really managing your backstory runs through big visions, hard targets and open admission of shortcomings. Shoe manufacturers should work to envision a boldly responsible shoe, one which not only incorporates their ambitions about the future of footwear, but also encompasses the cutting-edge standards in ethical behavior: a shoe, say, that has a one-planet ecological footprint and meets the highest possible labor standards. That company should share the vision of that shoe with every one of its customers.

And then it take the hardest step of all: admit the degree to which its current shoes fall short of that mark, and explain the steps it’s taking to bring its shoes closer to the gold standard. This has three benefits: the first is that achieving the gold standard is a competitive advantage in and of itself, reducing

liability and often raising the bottom line in the process. The second is that companies which reveal their shortcomings and an understanding of what those shortcomings matter earn an astronomical amount of market trust. They may even win over ethical consumers who wouldn't normally support the product but want to help the company in its efforts. When all is transparent, nobody can accuse the company of greenwashing. The third is perhaps less tangible, but I believe no less real because of it: the people in that company will be making shoes they can be proud of.

It's hard to do work you can be proud of these days. We live in an ethically compromised global economy, and almost every aspect of our lives is compromised as a result. But by acknowledging the gaps between practice and aspiration, and setting concrete plans for bridging those gaps, we lift a good part of that burden. Our shoes (or laptops or meals) may not be perfect, but we are pushing in a realistic way towards shoes and laptops and meals that will one day meet our ideals, and that, in and of itself, is something to take pride in.

I've said before that in these times optimism is a political act. Intelligent thinking about backstory management shows us something more: when doing business during a global crisis, idealism can be a practical act.

WISER

World Index for Social and Environmental Responsibility

WISER Project Overview And Progress Report[1]

December 2006

"It is perhaps not too much to say that, in the first decade of the new millennium, humanity has entered into a condition that is in some sense more globally united and interconnected, more sensitized to the experiences and suffering of others, in certain respects more spiritually awakened more conscious of alternative future possibilities and ideals, more capable of collective healing and compassion, and, aided by technological advances in communication media, more able to think, feel,

than has ever before been possible."

RICHARD TARNAS

Summary

WISER serves the people who are transforming the world. It is a collaboratively written, free content, open source networking platform that links NGOs, funders, business, government, social entrepreneurs, students, organizers, academics, activists, scientists, and citizens. WISER creates the space for civil society, the private sector, and government to collaboratively define, address, and solve social and environmental problems. The more than

[1] Natural Capital Institute 3 Gate Five Road, Suite A Sausalito, California 94965 415/331-6241 www.naturalcapital.org. Editor's Note: Images and screen shots as well as a table of topics, short staff biographies, and a discussion of marketing plans have been left out. Visit WISER at http://www.naturalcapital.org/wiser.htm.

one million organizations and the one hundred million individuals who actively work towards ecological sustainability, economic justice, human rights, and political accountability work on issues that are systemically interconnected and intertwined. Their effectiveness to prevent harm and institute positive change is undermined by the lack of a collective awareness, duplicative efforts, and poor connectivity. We are moving from a world that is shaped by privilege to a community created world. This massive change in the loci of power calls for a new system of awareness, support, communication, and collaboration. That is WISER's purpose.

While the themes of recent history are unknowable and far too supple to be categorized or labeled, common global themes are emerging in response to cascading ecological crises and human suffering. These ideas include the need for radical social change, the reinvention of market-based economies, the empowerment of women, ecological activism on all levels, the need for localized economic control, the rights of the child, changes in governmental structure and citizen dialogue, calls for autonomy, the concept of the commons, the reinstatement of cultural primacy over corporate hegemony, the creation of food webs, the retrieval of agricultural sustainability, the spread of multiculturalism, the concern for refugee populations, the building of a culture of peace, the drive to prevent drastic climate change, the demand for radical transparency in politics and decision making, the greening of the city, the creation of mass movements, and the push for human rights. These themes take specific shape in the form of public benefit organizations (called NGOs or non-profits) that collectively comprise the largest social movement in human history, in socially responsible business practices that are permeating all of commerce, and in responsive local governments who are moving to embrace sustainability as the key to a better life for their citizens. This movement is rewriting the rules as to what counts as truth, and what constitutes value.

WISER is currently being applied to non-and for-profits in the form of WiserEarth and WiserBusiness respectively. We anticipate the formation of WiserGovernment.

Fundamental Principles

WISER is based on seven fundamental principles:

- **Transparency.** WISER is open and subject to full public scrutiny always..

- **Neutrality.** WISER is impartial. It is objective. It does not take sides.
- **Diversity.** WISER is based on respect for the uniqueness of human life and embraces all dimensions of race, ethnicity, gender, sexual orientation, socio-economic status, age, physical abilities, and religion.
- **Community**. WISER is owned and operated by its community. Content is free of copyright; all software is open source; all information can be repurposed and used by others.
- **Collaboration** WISER shares information across geography, culture, and language. By working together, we become more intelligent and humane in our practices and more effective in our use of resources.
- **]Networking** WISER promotes and provides better connectivity between individuals, organizations, businesses, and governments. It will operate on all bandwidths and in most languages.
- **Visibility** WISER allows the invisible to become known, the small to become seen, and the network to be mapped.

Capabilities, Functions, & Offerings

WiserEarth promotes positive social change by empowering the largest and fastest growing movement in the world—the hundreds of thousands of organizations within civil society that address social justice, poverty, and the environment. WiserEarth provides tools to help these organizations find each other, collaborate, share resources and build alliances. WiserEarth…

- Contains the most extensive **database** ever created —over 100,000 organizations based in 243 countries, including contact details, maps, areas of interest and mission statement.
- Offers **advanced search tools** enabling users to find out quickly and easily ‘who is working on what’ and ‘where’ so that organizations can leverage their experience, knowledge, and resources.
- Provides funders with an **information landscape** of all organizations engaged in program activity in their field of interest, a helpful tool to better evaluate proposals and dockets.
- Makes information available to **help grantees** move towards greater

alignment and collaboration with other groups.

- Provides an instant and **effective means for many people to give** small amounts of money to organizations all over the world thereby broadening the global philanthropic base.
- Offers **free listings** of jobs, positions, and resources for organizations, prospective employees, interns, volunteers, and students.
- Supports individuated calendars that notify users of any and all events in their specific geography regarding their areas of interest.
- Establishes the means for **bioregional hubs** to empower local and living economies.
- Facilitates **free or extremely low cost VOiP communication** between listed organizations in the world (Skype and MINO).
- Includes a **relational and editable database** of organizations and individuals searchable by areas of interest, geography, type or organization, profession or pursuit (for individuals), and scope of activity.
- Contains the first **detailed taxonomy** of the organizations within civil society.
- Provides **lists of resources** including books, conferences, events, other databases, definitions, magazines, articles, podcasts, streaming audio and video, maps, research reports, and educational opportunities.

WiserBusiness is an open source knowledge base upon which a global standard for responsible business behavior can be founded and cared for by the wider community. It will hone and standardize the criteria determining responsible business behavior, link customers' social and environmental priorities directly to companies via consumer feedback and company evaluation mechanisms, and supply companies with the latest solutions. WiserBusiness

- Encourages radical transparency as a new model for business
- Provides businesses with the resources and guidance needed to implement responsible business practices
- Creates a space for industry members to share innovative techniques and learn from one another.

- Provides in depth evaluation of the impact of doing business on an industry-by-industry basis.
- Supports partnerships between businesses and non-profits to find creative solutions to social and environmental challenges
- Empowers a consumer by revealing the companies and the embodied values behind every brand.
- Gives consumers a mechanism for direct feedback to companies.
- Encourages a place-based economy.
- Reveals regional economic synergies, providing companies with a mechanism to streamline their resource inputs and waste streams.
- Contains the first detailed taxonomy of responsible business practices.

Additional features of WiserBusiness include:

- **Best practices:** The methods, measures, and examples of responsible business by category and industry.
- **Industries:** A framework for understanding social and environmental issues related to a particular industry.
- **Companies:** A database of companies and their track record with respect to responsible business practices.
- **Organizations:** A list of non-profits and government agencies working to promote responsible business and ecological practices.

Platform & Applications

WISER Platform is the technology that makes the collective awareness, support, and communication possible. The software and information generated by WISER is created under open source license as governed by the Open Source Initiative (OSI), which makes the code and the application freely available for the good of the community. It allows for certain terms, which allow modification and further redistribution of the code and software without payment, but restrict users from selling it. Any and all iterative improvements made to the code by subsequent users are available to all users. The theory of open source is simple: when code is subject to modification and change by

many programmers, it rapidly evolves and improves. It is the same principle that informs all of WISER. If we can provide a means to freely exchange information and communicate ideas, it will vastly accelerate understanding, social evolution, and adaptation.

The core elements of the platform that will be common to all uses are:

- **Relational database structure** housing information on organizations, businesses, individuals, responsible practices, and resources including books, conferences, events, other databases, definitions, magazines, articles, podcasts, streaming audio and video, maps, research reports, and educational opportunities.
- **Categorization** of and ability to search all information by areas of interest, geography, organization type, industry, scope of activity, responsible practices, and profession or pursuit (for individuals).
- **Community editing and contribution tools** to allow content to grow organically.
- **User management** to track the history of all edits and establish an editing hierarchy based on community-voted credibility ratings.
- **Open ID** to allow users and user preferences to move seamlessly between all WISER applications.
- **Arrangements of entities and resources into Interest Portals** around areas of interest, industries, practices, and regions. These portals would allow for the incorporation of features to increase connectivity and discover synergies between organizations, businesses, the government, and individuals.

WiserCommons began when WISER and the Interra Project explored ways to share information and relationships. From that first meeting it has grown into a community driven effort to create a means for all organizations to share information. Currently, organizations are posting information, resources, and calendars to individual websites, but this information cannot be freely and easily exchanged. It remains in silos and most users do not necessarily know where it is or how to access it. WiserCommons is a member-centric, control-free zone of activity in which members agree to cooperate in the creation of public goods to be freely used by all members of society. WiserCommons will

establish cooperation agreements and protocols so that the work done by one organization/website can be easily and in some cases automatically repurposed by another. This represents a pooling of resources, precisely the activity

WISER hopes to foment. NCI will act as fiscal sponsor for WiserCommons and supplies the tools for it to succeed. NCI and Interra have spearheaded this effort together and will continue to do so until it has the necessary infrastructure to be run by its members. Participating member organizations in WiserCommons to

Measures of Merit

The success of WiserEarth will be judged in five ways: the growing breadth and depth of information contained in the database; increased usage of features and ownership of the information by the organizations and individuals themselves; the transparency of the site's development process; the relationships that are built and the collaboration that is engendered between groups; and the increased awareness about global civil society in the media, and with students, politicians, and businesspeople. We are dedicated to developing a true global resource, one that embodies and mirrors its tenets. The success of the project depends on our ability to create a tool that is so useful that people throughout the world will want to be part of the WiserEarth community.

- Usage of features and ownership of the information by organizations and individuals over time (measured through website traffic analysis including number of unique and repeat visits, navigation paths, referring sites, use of editing tools, number of APIs downloaded, number of links/cross references to the site).
- Growth in the breadth and depth of the information contained in the WiserEarth directory (measured by the number of organizations in the database, number of countries included, number of languages provided, as well as ongoing accuracy of information post-launch).
- Market research studies with WiserEarth's user base to ensure that all audiences (non-profit professionals, community leaders and organizers, activists, funders, academics, and students) are being effectively reached and served.
- Tracking of media coverage and commentary.

Measurements of Success for the WISER platform will be assessed by:

- Non-directory specific site enhancements (continual updates and improvements to the site including community-developed plug-ins for connectivity).
- Once donation mechanism is offered, total dollars donated to organizations across the world.
- The initiation of new non-profit projects initiated as result of networking through the portal.
- Efficiency of fund use due to reduction in duplicate efforts of non-profits working on same projects.
- Things happen and are created that we didn't predict.

The Maker's Bill of Rights

Jalopy, Torrone, and Hill[1]

[1] Drafted by Mister Jalopy, with assistance from Phillip Torrone, and Simon Hill.. Original at: http://www.makezine.com/04/ownyourown/ Snazzy Make magazine poster reprinted by permission. Mister Jalopy: hooptyrides.com. Make: makezine.com

3D printing and open source design

James Duncan[1]

To imagine how 3D printing works you need to imagine slicing an object into thousands of layers. The print head extrudes material wherever material needs to be, and then moves on to the next layer, eventually building up enough material that a tangible, touchable, physical object is created. The idea is trivially simple, and advances in material science are making the field more accessible every day. Already, in labs around the world, we are printing electronics. Already we are printing plastics. It's only a matter of time until the two are combined and these machines of the future appear in our homes. Assuming this future happens, we have to ask ourselves, "How does it change things?" One of the most startling impacts it has is the impact on the value-chain of modern life. Since the industrial age the value has been held by the people that own the factories. Their ability to make millions of the same item has provided a cheap, cost-effective supply. The person who provided the factory with the thing to make (the designer), has remained poorly compensated by comparison. One possible outcome of 3D printers in every home is that the designer becomes the holder of the value once again.

Of course, design can be copied, in the same way that software can. It exists as a concept, can be expressed digitally, and is therefore just as susceptible to the same pressures that software, music, movies, and other forms of media are. Will we see a similar open-source design effort? Perhaps, and to achieve that, our open-source designers of the future are going to need some tools of their own. Looking at Open Source software, it's clear that the tools used by developers around the world are vital to their ability to share and collaborate. For example, the `diff` tool examines two pieces of source code or

[1] James Duncan is VP of Technology at Marketingisland, in Montreal, Quebec. Prior to joining Marketingisland James worked for Fotango Ltd, a Canon subsidiary, first as its Chief Scientist and then as CIO. While at Fotango James spent time researching many emerging technologies, including 3D printing. When James finds the time he blogs at http://www.whoot.org/.

text, and describes their differences. This trivial piece of software is a key enabler of open source software. Without it, developers around the world would be reading through thousands of lines of code that another contributor had submitted, searching for the one or two lines in the file that may have changed. In order for to enable open source printable hardware, the emergence of a `diff`-like tool for 3D structures would be highly beneficial. Of course the differences between structures could be identified in a text-form using the current `diff`, but to be truly beneficial some mechanism of 3D visualization of differences in two objects would be of great importance.

As important to `diff` in the open source community, is the `patch` program. `patch` takes the output from `diff` and alters the original file to match the new one. The clever thing about this is that now instead of transferring large files between developers when a bug fix or a feature enhancement was made instead diffs could be applied to files. Something that was useful for the developer for expressing a change became a change—it altered `diff` beyond merely being a tool humans could understand to being a tool that the computer could understand. The communication and the action were one and the same thing. In order for our theoretical *3D diff* to be useful we need it to be an action as well as a message.

Of course, it is possible to use the existing `diff` and `patch` tools on current CAD models, but the main purpose behind these tools is communication and collaboration. In order to be truly useful a diff needs to be helpful in its own right. If I have a slot and tab arrangement on a physical object, understanding an alteration is much easier if I can see the slot to which my new tab will connect. I need to be able to understand the *3D diff* without the benefit of the original file. I need to understand its function without the need to apply the patch.

The final tool that needs to be developed is a compiler. Compilers (the kinds that work with software), already make many decisions for developers—type information, register allocation and folding, optimizations, and so on. These are all things that are taken from the hands of developers and expressed by the compiler. In a world where hardware is as malleable as software there is no need for a hardware designer to be making decisions about whether function should exist in software or hardware. The “matter compilers” of the future will make these decisions for us.

REBEARTH™: Growing a world 6.6 billion people would want to live in

Marc Stamos, B-Comm, LL.B[1]

Growing a world that 6.6 billion people would want to live in requires mass collaboration and vision.

Several years ago, the author and his collaborators became increasingly concerned about where our collective future was headed. In an effort to be a part of the solution, they started digging. One quote they came across changed the course of his life: "The best way to predict the future is to design it." (Buckminster Fuller)

Success leaves clues. Several years were spent researching history, politics, psychology, entrepreneurship, ecology, philanthropy, business, sociology, spirituality, and current events to discover an effective means of exciting, inspiring, and enabling people to design, build, and grow a world we would all want to live in.

REBEARTH™ is the name attached to this effort. REBEARTH™ seeks to answer the questions: What if the human footprint was a positive force? What could our world look like? And what tools and strategies already exist to grow such a world?

What is REBEARTH™?

REBEARTH™ is a connector. A hub linking vision with talent, capital, innovation, and leadership—all committed to executing diverse projects that

[1] Marc Stamos contends that social, economic, and environmental objectives—far from being mutually exclusive—are intrinsically linked. www.REBEARTH.com.

take us closer to a world we would all want to live in. Such projects would be executed in line with REBEARTH™'s core values, and realized by applying proven strategies.

REBEARTH™'s strategic, systematic, and infinitely reproducible approach will enable the design, launch, and evolution of a portfolio of related but independent projects.

What could a world that 6.6 billion people want to live in look like?

- A world where business increases employee morale, environmental regeneration *and* profitability;
- A world where children's toys are engaging, educational, profitable, *and* release nutrients when inevitably chewed;
- A world where desirable transportation and energy production are silent, clean, *and* profitable.

Or, as renowned visionaries William McDonough and Michael Braungart put it, "A renewably powered world, full of safe and healthy things: economically, ecologically, equitably, and elegantly enjoyed." How do we grow such a world? The answer is surprisingly simple. We can use what works.

Strategies that work

History has proven the strategies below to be uncommonly effective. Imagine what our world could look like if these strategies were directed and applied together, in a systemized, cohesive approach, to grow a world we would all want to live in.

The strategies below apply directly to growing REBEARTH™, and to any project growing out of the REBEARTH™ hub. The use of the word '*it*', in the strategies below, refers to both. In fact, '*it*' can also refer to anything: Architecture and Urban Planning; Products and Services; Energy Production and Sewage Treatment; Transportation and Commerce; Resource Management and Agriculture; Spirituality and Religious Study; Science and Medicine; Economics and Environment; Technology and Sociology; Schools and Governments; Laws and Nations…literally *anything*.

Give *it* a visionary mission…

Every one of the marvels that we take for granted today was at one point a laughable proposition. Visionary, bold, far-reaching missions not only come true and inspire diverse supporters; they have always been the ones responsible for all of our species' quantum leaps. Rather than scorn the dreamer, this strategy is simple—trumpet the *Visionary Mission* and share it widely.

Decide WHO will build *it*, then HOW *it* will be built…

After five years of extensive research, Jim Collins and his team of 24 discovered that the leaders of companies who exploded from good to great, and maintained their greatness for over 15 years, did not first figure out the route the bus would take to get to where it was going.

They "first got the right people on the bus, and the wrong people off the bus," and then together figured out the route.[2]

We will find the people who can help us find our path, ensure they in the right seats, and they will guide us to where we are capable of going.

Brand *it*…

What are the Promise, Core Values, and Strategies embodied? As Walter Landor said, "Products are made in factories. Brands are created in the mind."

Products are just objects begging to be used. Brands are filled with emotions. They can inspire, motivate, ease pain, create excitement, and open doors. The more coherent, compelling, and desirable the brand story, the more it will power the success of any endeavour. Brands, when their stories are effectively communicated, come to stand for the endeavours' promise/mission, its core values, and its strategic approach.

Systemize *it*…

Systemizing produces expandable and replicable results. We can grow models that work—models for the creation of just about anything—and tweak the model to make it increasingly more effective. Then lather, rinse, repeat as necessary!

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[2] Jim Collins, *Good to Great* (Harper Business, 2001), 13.

Continuously evolve *it*…

Problems → Solutions → Growth → New Problems (start again)

This strategy has been effectively used as a social/business model for centuries. Historically, and in the present, we run into trouble when we forget to continuously evolve, or only evolve when forced by circumstances. The best companies, governments, and relationships are always evolving. This cycle has no beginning and no end. Wisely directed, it is simply a strategy of continuous improvement—of evolution towards a desired end.

Make *it* a hybrid of commerce / media-education / philanthropy…

Initiatives that are a hybrid of all three are the most interesting to the largest number of people. They have also proven to be uniquely effective at creating positive impact—for individuals, economies, and communities.

Any initiative can be designed to be profitable, pedagogical, and yield a social return. In fact, it is the combination of all three that feed each other. Philanthropy creates goodwill, and a socially-beneficial business that is lucrative makes a good story. Good stories spread, educating and creating demand in the process, which leads to more business. Imagine what our world would look like if this became the new norm.

Design *it* to mimic nature…

Nature represents impeccable design. From a design perspective, Mimic Nature, or biomimicry, means widely applying the following four design strategies distilled from nature:[3]

- Waste = Food: Design all goods and services to feed natural systems or go back into the industrial cycle.
- Natural Energy Flows: Harness sunlight, wind, waves, geothermal sources, and gravity to meet all our energy needs.
- Diversity is King: Draw from infinite variety to achieve abundance and balance.
- Think Holistic: Ensure all discrete decisions benefit the whole.

[3] William McDonough

Mass collaborate to design *it*, build *it*, and evolve *it*…

Mass Collaboration takes many forms. For example, *Ideagoras* are marketplaces for ideas, innovation, and uniquely qualified minds. *Peer Production* has been used to produce an operating system, an encyclopedia, media, and even physical things like a motorcycle. *Prosumers* are consumers entering the conversation with businesses to help design the products they will ultimately purchase and use. *Radical Sharing* expands the logic of sharing and can apply to virtually any industry or initiative. Since new and expanding markets create opportunities for everyone, collaboratively innovating to grow such markets benefits business, humans, and the environment.[4]

It should also be noted that the debate over which is more powerful, collective intelligence or expert/visionary leadership, misses the point. Collective intelligence has far more potential horsepower—provided that someone, typically an expert or visionary, takes the steps to orient and direct it.

Teach people how to do *it* / enable them to do *it* / benefit from them doing *it*…

It is like the old saying goes: Buy people fish, they eat for a day. Teach them to fish, and they will not only eat forever, they will remember who taught them as well. Similarly, taking part in enabling the fishing makes the process even more win/win, because creating or providing the enabling tools creates new opportunities to profit and grow.

Grow *it* through branded strategic partnerships / entrepreneurial managers…

Think of it as branded venture capital. When capital, entrepreneurial managers/partners, and a clear brand identity/strategy come together, the results are stellar. An interlinked web of partnerships and businesses ("ring-fenced" as bankers call it), coupled with a venture-capital/private-equity model has many advantages over a single hierarchical enterprise.

This structure allows for infinite expansion—each venture stands on its own business case, each management team is focused on its own business and entrepreneurial goals—as long as it is right for the brand. Furthermore, while

[4] Don Tapscott & Anthony D. Williams, *Wikinomics* (Portfolio Hardcover, 2006).

each shares the benefits of being affiliated and branded, the failure of any one initiative has little impact on the whole.

Simply put: Create a clear brand identity, systemize a repeatable approach, find entrepreneurial managers with an equity stake, provide resources, and the sky is the limit with what can be achieved

Pre-sell *it* to diverse stakeholders, then build *it*…

This model has been used to fund real-estate developments, golf tournaments, business start-ups, etc. It can be applied to just about any initiative—including those designed to grow a world that 6.6 billion people would want to live in.

Work with human nature to do *it*…

We are a diverse lot of: Consumers and Business People; Voters and Politicians; Students and Teachers; Designers and Builders; Trendsetters and Followers; Generalists and Specialists; Professionals and Blue-Collar Workers; Artists and Scientists; Visionaries and Builders; Capitalists and Socialists; Philanthropic and Greedy; Secular and Religious; Dreamers and Naysayers; Rich and Poor; Left Wing and Right Wing; Hopeful and Scared; and *everyone* in between—with diverse motivations.

Since it unlikely that 6.6 billion people will ever all *care*, *sacrifice*, or be inspired by being *less bad*, why not capitalize on the strengths and predictability of human nature? Why not orient its rich diversity towards designing and building a prosperous, healthy, and regenerative future?

Connecting the dots

The innovative projects coming out of the REBEARTH™ hub will apply the effective strategies above, and any others that have proven effective, to take us closer to a world we would all want to live in, rather than put band-aids on the mistakes of the past. They will be projects that excite, inspire, and enable people to be a part of, and benefit from, growing a world 6.6 billion people would want to live in.

What kind of projects could come out of the REBEATH™ hub?

Potential projects are limited only by the imagination, and can span an endless array of social, economic, and ecological sectors. An example of one such project is an open-sourced, mass-collaboratively designed, funded, and built house of the future—slated to be REBEARTH™'s prototype launch project.

Why a house? Housing touches almost every aspect of civilization: Family, community, shelter, food, energy, finances, transportation, waste management, sewage, air quality, materials, etc.

A holistic house designed in this fashion can provide a glimpse of what our future could look like in all these areas. Similarly, the educational potential of sharing the innovation connected to execute such a project is vast. And, best of all, it also allows for an incredibly diverse spectrum of contributors and collaborators to be rewarded for taking part in transforming vision into reality.

What is required to make all this happen?

The short answer is people. People with belief. People with talent. People with capital. People with connections. People with a desire to grow the world envisioned in this article. Are you such a person?

Île Sans Fil: Montréal community Wi-Fi: Interview with Michael Lenczner[1]

Mark Tovey[2] and Michael Lenczner

Mark Tovey: Can you tell me a little bit about the project you have to bring wireless to downtown Montréal? You're really one of the founders of that.

Michael Lenczner: I'm one of the founders of Île Sans Fil, which basically means Wireless Island. It's a community wireless networking group, inspired by the likes of Seattle Wireless, and NYC Wireless and others. We started it up in the Summer of 2003. The goal was to promote free public wireless and internet access in Montréal's public spaces; and also to use that infrastructure to create and support local community.

MT: And, can you tell me about the ways in which it, in fact, does create and support local community—the kinds of things it enables that simply weren't possible before?

ML: That's the second mission; it's actually what's a bit different about our community wireless networking group.

There have been about 300 of these worldwide. I'm sorry, just in Europe and North America, it'd be about 300. And most of the focus there was really either on creating a mesh network that was a kind of an autonomous local internet, or municipal network, owned by citizens, or it was to have this free wireless in public spaces thing.

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[1] Michael Lenczner is a founder of the Montréal Community Wi-Fi network Île Sans Fil. This is a distilled version of a conversation that took place on 12 September 2006.

[2] Mark Tovey is doing his Ph.D. in the Advanced Cognitive Engineering Lab at the *Institute for Cognitive Science at Carleton University*, and is editor of *WorldChanging Canada*. www.marktovey.ca.

But this kind of social aspect is a bit something that we've brought to the mix. Done also by NYC Wireless a bit. They had some art stuff with their network, and had a bit broader vision, but we really focused on that second goal. So what we did is created Wifidog, which is an open source software project, that's wifidog.org. And that manages our hotspots. And that sits on the router, and on all of our hotspots. And when users connect through wireless networking, they are brought to a web page specifically. They are made to log in, create their own account—we don't care what. You don't have to have a verified email address or anything like that. We don't have to know who you are really.

But they're brought to a web-page specific to that location. And what we do with that location, with that web-page, is that we try to aggregate information from the Internet, try to show people what Internet content is available—what the Internet should look like from that location, including a kind of profile of who else is on line, and who has recently been online.

MT: Wow. So if they have knowledge of who else is online or recently been online, how can that be used to build community, or even build a sense of community?

ML: I guess the first one is getting people into those public spaces. So it's not just trying to share free Internet access. Because you know that most of our clients have Internet access, because they have laptops. And Internet access is actually relatively inexpensive and ubiquitous in Canada, because we have had good government involvement in that way.

So, one is getting them to come from the homes into public spaces. First places where you live, second, places where you work. Third, places where we gather. So just by offering this to independent cafés is promoting these people spending time in third places, instead of first or second places.

And then, one example of what we do right now, is we grab Flickr images from Flickr's API, and make them show up on the portal page. So you can interact that way with each-other.

And the goal is actually get rid of the computer, and have people talking, talking to each-other, and hearing stories about this space that they're in, about feeling connected with that space that they're in. Trying to use computers to lower the barrier, to get to that sense of belonging, and sense of interaction between people.

MT: Can you give me a practical example might be like? Like: I'm sitting in a café that's decided that has said, "OK, we'll join this free wireless internet". And I can see who's around me, and who's also using the wireless internet, I suppose? What would that actually look like on the ground?

ML: When you log in, we would aggregate information to that portal page, from the blog of the owner of that shop who has a blog, and create an aggregate of posts using trackbacks, so that people can send trackbacks to a portal page to have their blog entry show up on that portal page [and] having Flickr content show up on there, if we tell them what tag to use. Have Flickr content show up there, and also have art by local artists and photographers show up on those portal pages. So we're still a long way to go in terms of having a really usable, dynamic place, but that's what we're really working on right now.

It's so interesting because it's outside of the normal open source software, and it's outside of the ordinary community networking kind of goals—really having that focus on user interaction and physical location, and trying to nail that as close as possible.

But also what's also interesting is that our model has been picked up by four other groups now. Three other groups in Canada right around us—so Toronto, Ottawa-Gatineau Wireless, and Québec Sans Fil is just starting up.

And they're all using our software, wifidog, and using our model of charging café owners $50 a year, and having them buy the equipment. And having this all be volunteer run.

MT: OK, so if there was something missing from your current toolkit, what would that thing, or way of doing things be? What would sort of like to see come into existence, above and beyond, as a sort of upgrade to what you're doing now?

ML: I'd like to see kind of what it is that you're working on—which is a better sense of how these projects work together, have a better guideline for open source methodology. So that would be the real request: to have the community of people that are online, involved in these kinds of projects, to really have a more mature, and more spread-out understanding of the methodology of these projects. So why does Wikipedia work, why do open source projects work?

Community wireless networking is very interesting specifically because it takes open source methodology and applies it to grassroots location-based, local

community projects, in a way that no other groups do.

So that's what I think is really interesting about community wireless networking, is that if you have 300 groups across Europe and North America, that are taking these methodologies that are being developed online, and finding ways to apply them to local community. So how do you use them to apply to city council? How do you use them to apply to local business partners? To interact with local constituents?

That's one thing. A tool I'd love to have would be people studying, for example, how community wireless networking groups are applying open source methodology, and how are they modifying it, importantly, to have it work in local organizing.

MT: So you've talked a little about how to bring people in very local areas together. Do you have any thoughts about how you could bring people from disparate parts of the world to talk about things? Somebody in a café in Jakarta, and somebody in a café in Sydney, and somebody in a café in Tokyo, and somebody in a café in Montréal?

ML: I think there's a lot of work being done on that, and I'm explicitly working against that.

That's one of the reasons I started up Île Sans Fil—was that I don't like the fact that it's as easy to talk to someone across the world as it is to talk to somebody next door. I'm trying to find ways, as are many other people, to use the Internet to privilege local interaction.

And that doesn't mean making farther interaction impossible. But the idea of having everything being on the same sense of ease—not one being privileged over the other, is something I kind of dislike.

So a lot of people are working on the other side of things, of reducing barriers, of getting rid of geographic barriers. But I think there's some important work to be done on how you can use these tools to privilege local problem solving, privilege local interaction, and privilege local cohesion.

MT: Can you give me a sense of some of the reasons that it is desirable to encourage local interaction and local participation?

ML: I guess a lot of it is motivated by a gut feeling of a sense of not belonging—or not feeling very much attachment to the places that I live—so

not knowing neighbors very well. Just this idea of city living. Being a mass of anonymous individuals passing each other every day. So that's part of the reaction—that kind of emotional feeling.

In terms of why should local connections be privileged over global ones? I think that you can make an argument that people are better caretakers when they feel an attachment to their local community. So, to care about environmental matters, to care about political matters, political and civic matters—you know, simple acts of reciprocation and generosity, I think that happens when you feel like you know—and you belong to—your local community.

MT: And I remember, for instance, when meetups.com came into existence, I thought, 'wow, this could allow me to get to know people in my community in a way that was very easy'. And, in fact, it would mean that if I moved to another community I could start putting down roots in that other community pretty quickly. Get to know people who were interested in the same things as me.

And so I really can sense the possibilities in community wi-fi as you've described for meeting new people, and meeting people right around your area, and all of those kinds of things.

And perhaps, what I'd like to do is get a picture of somebody who is moving to a new area—who is moving to a new house, or a new apartment, and has got a wireless hotspot near them, and doesn't know anybody—and how would they come to start getting to know their neighbors?

Obviously there are the usual ways of just going and introducing yourself to people, but it seems that this could enable some extra possibilities and again, how would you advise that person, what would you say—look—this is what you would go and do.

ML: So, this is where you're not just going from step one to step [two]. It's a little more convoluted this stuff that we're working on. We have 22,000 users right now after three years and 115 hotspots. We're increasing at four or five hotspots a month, and a thousand users a month. We are getting a sizable piece of the early adopters in Montréal. And those people have a fair amount of influence in their groups around them of getting people to use different technologies, and comfortable with different technologies.

So the idea is to get profiles for those 20,000 users, and have it be usable in a

way that makes them actually be interested in terms of giving them some features that they'll like, to be able to find out—if people choose to make this information public—who's online, and where, kind of thing, ala Dodgeball, which is a cell phone friend-location-service that was recently bought by Google. To have those kind of things happen. But then get them using these services, using these profiles, and once calendar syndication gets itself sorted out, which would be—you know, we're all waiting for that to happen.

Get these people using these services at home. So it's not about, necessarily, wireless use at all. It's turned into a location-based portal that you can use for your home that's, yes, you can see what information is relevant to what café you're at, but then if you want to go home, you can go up a level and see what information is relevant to your quartier. And the information we're going to privilege is cultural information, environmental information, specific information, and user-generated information—user-generated content. So it's not just any information. We know that we're playing a kind of editorial role in the content we're promoting.

So that would be the idea: in your profile you would have the first three digits of your postal code, which doesn't say where you live, but it say approximately what block or two you're in. And when you come into a new area, you'll be able to look on that—it wouldn't necessarily mean going to the local café at all. But looking on there and saying, well, these are the environmental resources that are close to me. These are the civic information things.

Working with services like howdtheyvote which is a service which scrapes the Hansards, the parliamentary record, it scrapes that, and then separates it [by] MP, and then we would work with them to aggregate that content on a location basis and make that available—promote that content to our users.

So, that's the way we're trying to work things. We have these users, we have this captive audience right now. And we're not going to try to make our own calendar syndication, make our own civic information, make our own environmental information, but tying to outside sources—ala Web 2.0.

We don't have the resources to make all these different features. So use other people's features, Flickr, Eventful, Upcoming, whoever figures out calendar syndication, and then introduce that content to our users.

MT: What is calendar syndication?

ML: Calendar syndication is when I can have a blog, and I have a calendar on my blog or on my CMS, be able to post events, and people would be able to subscribe to certain of those events, and they would go automatically in their calendar, and they would be able to pass those on. So right now there's calendars that spit out RSS, but RSS doesn't go into mycalendar. There's iCal[endar] formats, but that's not sent back and forth, calendars don't talk very well. So when they do that'll be a really big thing, and there's different people working on it, but so far it hasn't come together yet.

MT: What do you see as the possibilities if many parts of the world start doing as these four cities have started doing in terms of localizing? In terms of showing people what's available right in their neighbourhood, in terms of allowing them to participate online, in terms of very local neighbourhood activities. Both in terms of calendaring, and presumably in terms of blogging about what's going on right where they are. Being able to share information about local—not only events, but cultural hotspots—restaurants—what's really going on where they are. What do you see as the possibilities for the world if everybody got more in touch with their local community?

ML: Yeah, that's a great question. I don't think I've thought about that all that that much. I've been really focused on my own city.

But I think there's a lot of information about people's local environments that isn't necessarily not public, or private, but it's just in the way that people run into it daily. You can imagine what would happen in terms of government, if there was more transparency and accountability, and feeling like people knew what was going on. If I get an email every week—what my MP was saying in parliament—I think that's a powerful way to get people to be more informed voters. You know, what happens when you get more informed voters?

We at Île Sans Fil have somebody else, a guy out in B.C., that's working on a website which scrapes parliamentary information, and makes that available to people. And then Île Sans Fil has the stuff where we can tell people about that content.

So we have the eyeballs. Because we're putting our time maintaining this infrastructure, and building this infrastructure, and getting users who don't necessarily care about this information. But we can force them to see it, with a captive audience.

I think you can have a more informed democracy. I think you can have all the

serendipity that happens when information about your local environment is more available. But, I don't know—that's a great question. I'll leave it to other people to puzzle through that.

The power of the peer-to-peer future

Jock Gill[1]

As we consider our choices for a better tomorrow, at least a livable tomorrow, it is clear that one requirement is that we take a fresh look at how we use our resources. Are we making the best possible use of them such that they can best serve the greatest number of people while doing the least damage to our challenged natural environment? Clearly, our resources are not infinite and the choices we make in how we use them have serious consequences, unintended and otherwise.

We have to discover which of our current choices for managing resources such as electricity, spectrum for communications, water for life, politics, our economy, and so forth, can be managed in new ways that will greatly increase the efficiency with which we use them while increasing the benefits they provide us in a fair and just manner.

The primary question is this: Are our current utilization, production, distribution, and consumption models any longer the best choice for our future? Is it good enough to consider citizens as merely one-dimensional consumers? Or are there better ideas afoot?

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[1] Mr. Gill is President and Founder of Penfield Gill, Incorporated, a consulting firm specializing in New Media communications, marketing, and strategic planning. Currently, Mr. Gill is a cofounder of the not-for-profit Grass Energy Collaborative and the for-profit Biomass Commodities Corporation. From 1993 to 1995, Mr. Gill was Director of Special Projects in the Office of Media Affairs at The White House, where he was a key member of the communications innovations team which introduced electronic publishing, public access email to the President, and, in October 1994, the first White House web site—Welcome to the White House. Mr. Gill is a speaker on the history and future of information technology and new media. He has also been a senior product manager at Lotus Development Corporation, and was the founding president of Computer Access Corporation. http://www.jockgill.com.

Would we be better served if all of us were actively engaged as producers, distributors and consumers? Is there a model in place already that could allow us to realize this more rewarding and complex view of ourselves?

Let's start with a look at our current model for making and provisioning electricity. If we believe that you get three strikes, then today's centralized generation with grid distribution model is *out*.

Here are the strikes:

Strike 1: Very bad for global climate change—releases far too much sequestered carbon.

Strike 2: Very inefficient—wastes 80% of the resources it uses.

Strike 3: Fails to deliver electricity to over 25% of the world's population.

Strike 4: It exports energy dollars out of local communities and villages.

Strike 5: Is too risky. It creates too many single points of failure, as can be seen by our history of blackouts. Not to mention creating terrorist targets.

The old model has struck out at bat: even with a fifth strike! Time for it to retire and let a new batter reach the plate.

Electricity is a huge problem. How shall we, for example, get it to where it is not? It would appear that the centralized production and distribution model has failed 25% or more of the world's people. Perhaps it failed because its core organizing principle is flawed. It also wastes 80%, or more, of the energy it uses. Bad design. It also exports energy dollars out of the local community to who knows where and whose benefit.

A better approach, as the Europeans know, looks to be combined heat and power at the points of demand, at all scales from micro to industrial. It can be as much as 95% efficient in the best cases. It is also naturally and organically peer-to-peer in nature as one unit connects outward to another to form a micro grid for mutual self help and community security. It also re-localizes power generation, keeps energy dollars in the local economy and so forth. It is well know that dollars retained in local economies have a 3X or better multiplier effect on the local economy.

This is what I call the Peer-to-Peer Power Economy. The P2P model is quite possibly the most efficient way to manage many of our resources. The

P2P use of the internet—Skype is a fine example—is a fine proof of concept of the efficiency advantages that P2P can offer. Further, it supports the idea that every citizen can be all of producer, distributor and consumer—actively engaged in the enterprises of society.

Unfortunately, the Peer-to-Peer Power Economy, at least with respect to electricity, is actually illegal in the USA. Only those who have "patents" from the government are allowed to sell electricity across private property boundaries! We need to change these laws and regulations to enable P2P mutual aid societies very much akin to Ben Franklin's 18th century creation of mutual insurance companies, fire departments and so forth.

Will our next President fix this and not only enable Micro grids, but actually encourage them? How about a promise of CHP at the White House? In 1994 I was on the team that put the White House on the World Wide Web. In 2009, it will be time to make the White House a show case for Combined Heat and Power and the Peer-to-Peer organizing principal.

One can see that the above discussion about how and where we make electricity is one key to showing that more of the same old same old is not going to give anything other than more of the same old same old we do not like.

The P2P Power Economy is, of course, a disruptive innovation that is required if we want to truly address global climate change. Why required? Because we can no longer afford, allow? tolerate? a power production system that wastes 80% or more of the resources it uses.

Another key resource we are currently mis-managing is the radio spectrum we use for communications. Our 20th century spectrum management model creates artificial scarcities in spectrum that drive up prices and substantially increase the friction, costs and inefficiencies or our communications infrastructure. Given everything we have learned since the 1920s and the early days of radio, we could choose to manage spectrum as an abundance. We can do this if we are willing to embrace Open Spectrum principles, cognitive radios, and dynamic mesh network technologies supporting a Peer-to-Peer spectrum utilization model. This change also supports the notion that we all are naturally producers, distributors and consumers of communications.

In conclusion, we have so far failed to take full advantage of the principles of Peer-to-Peer organization. We are denying ourselves the power of P2P to increase our chances of creating a society truly greater than the sum of its parts.

Indeed, the move to a P2P based society is actively obstructed by today's incumbents who see it as a challenge to their business and political models. The fact of the matter is that it is just these old organizational models, which I call neo-colonial, that have brought us global climate change as an unintended consequence. If we stay with the old models, we choose self destruction. For the chance of a viable future, it is time we looked for some new ideas to guide us.

Can we give our children the freedom and tools to do so? Can we enable them to adopt the power of P2P across domains such as electricity, economics, water management, politics, and spectrum management? and so forth? This is where I suspect we have to go if we want to get from where we are today to a better place for all tomorrow.

Notes

David Weinberger's essay on Open spectrum (next chapter).

Gill, Jock, "Neo-Colonialism or a Peer to Peer Power Society?"
http://www.greaterdemocracy.org/archives/624

Gill, Jock, "Framework for a New Economics & a New Politics"
http://www.greaterdemocracy.org/archives/622

Gill, Jock, "How much longer will tomorrow be like yesterday?"
http://www.greaterdemocracy.org/archives/620

Why open spectrum matters: the end of the broadcast nation

David Weinberger[1]

The End of the Broadcast Nation

We are *not* in the age of Information. We are *not* in the age of the Internet. We *are* in the Age of Connection. Being connected is at the heart of our democracy and our economy. The more and better those connections, the stronger are our government, businesses, science, culture, and education.

Until now, our connectedness has depended on centralized control points that have been the gatekeepers of our economic and political networks. To speak to everyone, you had to be one of the few with access to a broadcast networks. To sell to everyone, you had to be one of the few with access to a global distribution channel. To achieve office, you had to be one of the few with access to corporate coffers and national media.

But we are on the verge of being able to connect to anyone and everyone, whenever and however we want. No gatekeepers. Ubiquitous connection. Connectedness that's always there and always on. This isn't about getting more TV channels. Change the way we're connected and you've changed everything, from the economy to governance. This is how fundamental transformation occurs. in this context, spectrum has nothing to do with electromagnetic waves and auctions. It is far more fundamental: Spectrum is connection.

[1] Jock Gill, Dewayne Hendricks and David Reed contributed ideas, information, links and words to this paper. All errors and infelicities are mine, however. Last updated: 1.21.03. See also**:** www.evident.com The Open Spectrum FAQ**.** The author is a Fellow at the Harvard Berkman Center for Internet & Society.

We will connect. The human drive for connection is too strong to be stopped. The market and the electorate are clamoring for this. Consider just some of the more obvious changes:

When consumers are connected, we turn off the marketing messages and tell one another the truth about what we buy.

When students are connected, they teach each other and work collaboratively…even if they are still being graded as if each assignment were done alone in a cell.

When citizens are connected, we put our money and our votes with politicians who join the fray. Safe, phony words and please-everyone positions sound more hollow than ever. We want our government to recognize and reflect the values connectedness brings.

When an economy is connected, goods and services move faster. Little players get a foothold against the giants. Innovation skyrockets. Risks are taken and investments are made. The old gatekeepers of connection find their treasure is now a commodity. But that commodity fuels an outbreak of economic growth that will last for decades.

When a society is connected, it becomes more fair. Broadcasting's lock on the channels of communication is broken, so more voices are heard and people are better able to determine their own individual and collected fates.

The Age of Connection will begin with a fundamental change in metaphors and a basic reframing of the issues.

Reframing the issues

The conversation about Open Spectrum needs to be re-framed. We cannot afford to talk about it in terms of interference, pipes, scarcity and property any more. Those metaphors are getting in our way.

- Not how we can slice up the spectrum ham ... but what will bring the greatest connectedness?
- Not spectrum as a thing ... but as an open standard.
- Not who owns spectrum ... but whether we even need a handshaking "etiquette" to allow devices to communicate wirelessly.

- Not how many bits can be carried by a particular slice ... but how do we move information from every A to every B most efficiently?
- Not whether this megacorp should be allowed to own that particular station in some specific city ... but how can we turn an audience into a conversation?
- Not how scarce is bandwidth ... but what can we best do with the abundance?
- Not how can we tinker with the current policies ... but what policies would create the most freedom, wealth and value given the new technological possibilities?

The old metaphors are broken. The new metaphors will change the way we connect with one another and thus will change the world.

How we got here: Technology and bad metaphors

Current spectrum policy is based on bad science enshrined in obsolete ways of thinking. The basic metaphors we've used are just plain wrong.

Pipes—the first metaphor treats spectrum as if it were a pipe. A pipe has a measurable capacity: a predictable volume of water can flow through a municipal water trunk. Of course, this analogy makes certain assumptions, such as that water can't be compressed effectively and you can only send one stream of water through a pipe at any one time. In the context of these assumptions, it made sense for the Federal Communications Commission to begin licensing spectrum as if it were a scarce resource under the framework established by the Communications Act of 1934.

Interference—the second metaphor thinks of the electromagnetic energy as waves that can be deformed by interference. In fact, electromagnetic waves can pass through one another without distortion. The policies set in 1934 by the FCC prohibiting two broadcasters from using the same frequency treat interference as a law of nature rather than as a limitation of the technology of that time.

Consumption.—the third metaphor thinks of wireless communications devices as consumers of bandwidth. Every time a broadcaster receives a license, the amount of available spectrum goes down. Spectrum is not only a finite

resource, it is a scarce resource, at least according to this metaphor. New technology, however, increases bandwidth with the number of users.

Property—the first three metaphors lead to a fourth. As a pipeline to an audience, a licensed slice of spectrum has had tremendous value. Because same-frequency waves would interfere with one another, the broadcaster had to be given exclusive access rights. Spectrum thus took on the practical characteristics of property: something of value to which someone, by legal right, has exclusive access.

Three advances past the old metaphors

These metaphors are misleading and outdated, reflecting the state of technology over 70 years ago. They came before information theory, the Internet, and Hedy Lamarr made obsolete any policy based on interference and scarcity as if they were laws of nature.

1. **Spread spectrum**. Before Hollywood made Hedy Lamarr “the world's most beautiful woman" she was an Austrian aristocrat married to an arms merchant who was so possessive that she had to drug his maid in order to escape. In Hollywood, she became friends with George Antheil, an *avant garde* composer. One day, while playing four-handed piano with him, she realized how to defeat the jamming devices used to keep radio-controlled torpedoes from hitting their target: rather than staying on a single frequency, the transmitter and receiver could be synchronized to switch bands like four hands moving around a piano keyboard. She and Antheil were awarded a U.S. patent on the invention in 1942, and in 1958 electronics were sophisticated enough to enable the U.S. Navy to begin using frequency hopping as the basis of its communications. Spectrum-as-pipe does not make sense in a frequency-hopping world. In fact, Lamarr's invention directly contradicts the essence of the pipe metaphor: that there is a single medium, contained by hard walls, from A to B.

2. **Information Theory**. The next blow to the old metaphors came from Claude Shannon and Warren Weaver in 1949 with their development of Information Theory. The carrying capacity of a water pipe can be known with near certainty. Likewise, how many beer bottles can be filled per hour can be predicted based on the speed of the conveyor belt. But spectrum is carrying neither water nor bottles. It's carrying information. And information is not a hard-edged good: It can be compressed, in many

circumstances it survives some loss, and it is independent of the medium carrying it. A system optimized for carrying information, rather than for preserving the integrity of waves, would look much different than what we have today. And it would be much more efficient. In fact, current research indicates that the amount of information a frequency can carry increases with the number of users. The only question is how much it increases.

3. **The Internet**. The Internet teaches us three lessons loud and clear.

   (a) **Open standards work**. Rather than building a network that connects A to B to C by touching copper to copper, the creators of the Internet built a network by establishing standards for how information is to be moved. It is because the Internet was not built as a thing that it has been able to bring the world many orders of magnitude more bandwidth than any previous network. Our current policy, however, treats spectrum as if it were a physical thing to be carved up. By focusing on open standards rather than on spectrum-as-thing, the medium can become far more efficient and offer far greater capacity.

   (b) **Decentralization works**. Keep the architecture clean and simple. Put the "smarts" in the devices communicating across the network rather than in centralized computers. In fact, central control and regulation would have kept the Internet from becoming the force that it has.

   (c) **Lowering the cost of access and connection** unleashes innovation beyond any reasonable expectation.

Open spectrum will do for wireless communications what the Internet has done for networking computers.

Today's technology

As a result of decisions based on the science of the early 1900s, we built a system that works around technological limitations that 21st century technology has overcome. Advances over the past ten years knock into a cocked hat our most important assumptions about wireless communications:

"To get good reception, lock onto a signal."—Not any more. Just as a highway that allows cars to change lanes will have greater capacity than one that locks them into single-lane tunnels, bandwidth increases with adaptive

radios that can change their frequencies, modulation, and information routing to compensate for and exploit the current conditions.

"A radio is a receiver."—Until recently, a radio was a hard-wired device that could do one thing only: play music, receive voice data, etc. But software-defined radios are computers, capable of being reprogrammed on the fly. They can be upgraded after they are sold, and that they can dynamically be put to a wide variety of uses, enabling innovation far beyond simply providing more "stations" to listen to.

"The more you put into a network, the better it is."—The Internet—an end-to-end network—has proven this idea to be backwards. It's precisely because the Internet wasn't optimized for any particular application that it's useful to the broadest range of innovations. Spectrum can be architected the same way: as an information transport utilized by "smart devices" such as adaptive and software-defined radios.

"The more users, the less bandwidth."—Shannon and Weaver's Information Theory that guided the development of broadcast and point-to-point networks did not consider the implications of the way our cellular networks currently enable multiple simultaneous users. In the past decade, a variety of research teams have begun to explore this unknown corner of the theory, and have shown a variety of counterintuitive results that show that our assumptions about capacity and interference are just wrong.

"It's all about the waves."—No, it's all about information. Digital communications techniques such as error detection and correction, maximum likelihood estimation, Rake receivers, and other techniques developed based on Shannon's information theory and Digital Signal Processing provide a rich set of techniques that have not been used in radio systems deployed before 1990 (the bulk of commercial systems), i.e. before digital cellular telephones.

"Interference is a law of nature."—Very wideband modulation techniques such as DSSS (802.11b—AKA WiFi), OFDM (802.11a/g), UWB and many others use new technologies to spread information across many frequency bands, creating very high transmission rates at low cost with very little degradation even in noisy environments. They do not require "exclusive" use of those frequency bands, especially in a network that uses modern adaptive error-correction techniques, and they do not interfere with older technologies (such as TV) that uses the same frequencies.

What could be

Imagine a world in which we've changed policy to adapt to the new metaphors. There will be changes in three dimensions: short term, long term and deep term.

Short term, we will see a sudden breaking free from wireless gridlock. This will not only bring new, smaller players into a broadcast industry that has been locked up by media mega-giants. More important, it will enable consumers and citizens to communicate with one another. We will create our own content, but we'll also be in constant conversation. From these connections will emerge new social groupings, just as simple text messaging on telephones has created "flocking" behavior in Japan and Scandinavia. We will see innovations wherever action at a distance or ubiquitous access makes sense— including, incidentally, object-to-object communications as our household and office devices start to "talk" to one another.

Long term, we cannot predict the sort of innovation that will happen, any more than Marconi could have predicted WiFi 100 years ago. Predictions range from ubiquitous access to "personal knowledge avatars" to even Star Trek-style transporters "beaming us" across space. The only certainty is that our current predictions are inadequate to the reality that we will invent for ourselves.

Deep term, the unleashing of wireless connectivity will eat away at one of our last remaining social dependencies on broadcast media.

"Broadcast" isn't simply an industry. It is a network topology, an economic model, and a social structure with direct consequences for the political process as well.

- As a network topology, broadcast assumes that the messages are sent one to many.
- As an economic model, it assumes the "channel" is an expense and revenues come from the content that is broadcast (via subscription or advertising).
- As a social structure, broadcast assumes that the ability to communicate is unequally—and unfairly—distributed.

The result of these assumptions is a population that by and large is presumed to be sitting quietly, facing forward, consuming content developed by commercial interests. The effects of having become a "Broadcast Nation" are

profound. Our freedom is defined by the channel changer nearby. We expect power to be concentrated in the hands of those who have access to media. We expect politicians to be talking at us more than listening to us. We expect consumer goods to be “broadcast" the way messages are: identical goods flowing from a single source. We even experience The Famous as a special class of person whose lives are played out over the broadcast network.

We can get a taste of the effect of breaking free of the broadcast metaphor by looking at what the Internet is doing. The Net enables people to connect with one another, circumventing the broadcast chokepoints and the organizational chart formalities. We are at the beginning of a generational phase of innovation not only in technology but in ways we human beings are organizing ourselves. We're inventing new types of groups, new ways of writing, new rhythms of social intercourse.

To gauge the effect of opening up spectrum, take the energy of the Internet and multiply it, for all of that Net's passion and commitment comes from a medium that until now is overwhelmingly used to transmit text. It is a typed medium. Imagine when our connectedness is no long constrained to the speed of typing and the limits of a text-based presentation of ideas.

Certainly new businesses will arise commercializing the new inventions. More important, however, is the great democratizing effect this will have on our culture. We will get up off the couch and face one another. We will expect—demand—direct responses. Cant and marketing messages will be worse than insulting; they will be boring. We will be able to organize ourselves not just around ideas that can be typed but richer expressions of thought and attitude. Mood, emotion, and art—hard to convey in ASCII—will re-enter the global connection. A bottom-up conversation can begin over the ether, helping to make participatory democracy real.

We are not in the Information Age. We are not in the Age of the Internet. We are in the Age of Connection. To achieve the ideals this country was built on—equality, freedom of speech and thought, the basic fairness that lets people determine their own destinies—we need everyone connected to everyone else.

Spectrum is ubiquity. Open spectrum is equality and freedom.

Sources and additional reading

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David P. Reed's Open Spectrum page: http://www.reed.com/OpenSpectrum

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Mass collaboration, open source, and social entrepreneurship

Mark Tovey[1]

Generating substantive content collectively is nothing new—witness the thousands of contributors to the *Oxford English Dictionary* project. Begun in the late nineteenth century, it produced, over many years, one of the intellectual edifices of the twentieth century, unparalleled in any other language. *The Encyclopedia of World Problems and Human Potential*[2], begun in 1972, was originally print-based (3 vols, ca. 3000 pages), and derived its content not from individuals, but from the documents of organizations worldwide. Even before the World Wide Web came on the scene, thousands of people were typing in the public domain texts which formed the corpus of *Project Gutenberg*.

Many of our most cherished institutions can be seen as a product of understudied mass collaborative processes: city planning, map making, setting regulatory frameworks, negotiating peace treaties, drafting legislation, peer reviewed publication, and reconstructing ancient languages or cities.

The Web has accelerated the process of peer production[3], heralded by the success of large open source software projects. Linus Torvalds showed the way with Linux[4], which was followed by applications such as OpenOffice and FireFox, and fueled by industry participation. IBM has notably been paying

[1] Mark Tovey is doing his Ph.D. in the *Advanced Cognitive Engineering Lab* at the *Institute for Cognitive Science* at Carleton University, and is editor of *WorldChanging Canada*. This paper is based on a poster which can be found at www.marktovey.ca.

[2] www.uia.org/encyclopedia/volall.php

[3] See Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms Markets and Freedom* and the Foreword to this book, for more on peer production.

[4] Lakhani K.R. & Panetta, J.A. (October 2007). 'The Principles of Distributed Innovation.' Research Publication No. 2007-7. The Berkman Center for Internet & Society Research Publication Series: http://cyber.law.harvard.edu/publications

developers to work in-house on open source software initiatives[5]. There are thousands of open source projects[6] hosted at content repositories like sourceforge.net, and there are people who run their computers entirely on open source software.

Individual distributed computing projects (SETI@Home, Folding@Home, XGrid@Stanford) are giving way to open standards which allow anyone, regardless of computing platform, to donate computer time to large computing tasks of a humanitarian nature (World Community Grid).

The success of free software, and Richard Stallman's *GNU Public License* (GPL) gave open source software the legal framework it needed. This prompted a move by Lawrence Lessig and others to found a similar license for human-readable content, giving birth to free culture and the Creative Commons.[7]

Grounded by this license, and spurred by the new technologies that the Web (and now, Web 2.0) make available,[8] we are beginning to see large-scale collaboration on freely available content. Instead of being distributed over many computers, the work is distributed over many minds. Instead of writing computer programs, people are now generating knowledge. The Wikipedia project is the best known, but by no means the only, example of successful distributed knowledge production.

We are already seeing the emergence of peer production in the physical realm. In China, small shops are cooperating in assembling motorcycles with interchangeable subsystems in a distributed fashion.[9] Such practices could scale to build the first open source cars. Open source CAD (Computer Aided Design) is being used to make blueprints for future vehicles.[10] Peer production and

[5] Tapscott D. & Williams AD. (2006). *Wikinomics: How Mass Collaboration Changes Everything*. See Chapter 3: The Peer Pioneers.

[6] For an account of open source software, and why it works, see Eric S. Raymond's *The Cathedral and the Bazaar:* http://www.catb.org/~esr/writings/cathedral-bazaar/

[7] For a quick introduction to the idea of Creative Commons, see the videos at the Creative Commons website: http://support.creativecommons.org/videos#gc

[8] Michael Wesch's video ethnography of Web 2.0, *Web 2.0 The Machine Is Us/ing Us*, is an excellent primer: http://www.youtube.com/watch?v=Yv-UXJz1nCk

[9] Tapscott D. & Williams AD. (2006). *Wikinomics: How Mass Collaboration Changes Everything*. p. 220.

[10] There are at least two open source car projects, one project based around a philosophy of interchangeability and minimal parts (www.theoscarproject.org), and a

Open Source CAD offers the potential to introduce sustainable transportation technologies into the marketplace at low cost.

Other initiatives, such as ThinkCycle (www.thinkcycle.org), or Open Architecture Network (www.openarchitecturenetwork.org), aim at collectively solving "design challenges facing underserved communities and the environment,"[11] and open sourcing these designs. *Instructibles* (www.instructibles.com) allows people to show-and-tell the things they've built, and share how to build them.

Once clever solutions to long-standing problems[12] exist as open source blueprints (en.wikipedia.org/wiki/Open_design), they can be built as needed in underdeveloped areas through the use of 3D printing[13]. The RepRap project hopes to build an inexpensive, open-source, 3D printer which can print itself (www.reprap.org). On the higher end, Fab Labs are small scale workshops that can be used to build one of virtually anything (en.wikipedia.org/wiki/Fab_lab).

Modularity of code, object-oriented programming paradigms, and open APIs have enabled successful code re-use. Online content management systems and the set of social practices that surround them, have enabled large-scale collaboration on programming projects.

Inexpensive (or free) availability of software for producing media content, and more widespread literacy in that software, are allowing for peer-production of sophisticated media content that would have been unthinkable a generation ago. Reusability, mash-ups, and remixability are a logical consequence of open source, open APIs, and the Creative Commons. The ability to take content from one place and successfully and easily combine it with content from another, immediately allows for a form of collaboration between people who will likely never meet or even interact.

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second project based on a philosophy of sustainability (*The Open Source Green Vehicle Project* at www.osgv.org).

[11] quotation from www.thinkcycle.org.

[12] Consider, for instance, the *Pandemic Ventilator Project* (panvent.blogspot.com), the *Solar Heat Pump Electrical Generation System* (shpegs.org/index.html), *The EVProduction Club* (http://tinyurl.com/2jwepy), or David Delaney's *The 100% passive 100% solar house for a cold climate* (http://tinyurl.com/epd24).

[13] See James Duncan's chapter in this volume: '3D Printing and Open Source Design'

You can leverage mass collaborative techniques for social ends not directly related to computer applications, hardware, or artistic endeavors.[14] Distributed translation teams are translating dictionaries. The blogosphere is becoming a powerful force for analysing the news, and throwing up concerns that would otherwise be under-reported. Systems are being built to allow scientists to make public and replicable their computational models, which might otherwise remain inaccessible[15]. Scientists are establishing many new collaboratories.

It is becoming increasingly clear that we can use the virtues of open source, mass collaboration, cloud computing, and collective intelligence for tackling the tough problems the world is facing. These technologies and practices present humanity with a powerful lever. They make it possible for the world community to think collectively, transparently, and effectively.

To understand future democracies, we need to understand past democracies. To understand future legal and administrative systems, we need to understand past administrative systems. To understand future forms of collaborative working and co-working, we need to understand past modes of peer production. In each case we need mechanisms to extract what worked, and what didn't, what was missing, and what was available in over-abundance. We need to understand what the best practices were, and what the areas of blindness were. And we need to identify the vicious cycles that led to breakdown.

This will be a multi-disciplinary effort. We need historians, ethnographers, and foresight specialists. We need mediators, lawyers, and experts on democracy and deliberative processes. We need programmers and database experts. We need political theorists, cultural theorists, and cross-cultural psychologists. We need people who study free culture and peer production. We need philosophers of science. We need cognitive epistemologists and experts on cognitive bias. We need investigators who study distributed cognition and

[14] See Figure 1 for a summary of the various mass collaboration, open source, and collective intelligence movements.
[15] http://ispoc.cscs.lsa.umich.edu.

macro-cognition. We need more research on Wise Crowds[16]. There are many other specialties that can contribute to this effort.

Thomas Homer-Dixon talks about the gap between the seriousness of the many problems[17] we face, and our ability to generate solutions to them: *the ingenuity gap*[18]. There are collaborative tools and social modes that currently exist which, if combined, could scale into mass collaborative problem-solving mechanisms[19]. If these systems are built, and built effectively, they can help us get traction on some of the world's most pressing issues.

Workaday practices for the social entrepreneur

In the meantime, we are not without tools for the social entrepreneur. Familiarity with these tools can multiply the effectiveness of individuals interested in facilitating change in a variety of domains. Below are some practices that can be helpful for people interested in leveraging this space.

- Become proficient in the tools for **social networking** (facebook.com, LinkedIn.com, del.icio.us/, myspace.com, citeulike.org).
- Attend **meetups** in your city related to what you do (meetups.com).
- Learn how to produce content for the emerging **social media** (blogs, podcasts, Flickr, YouTube). Contribute your voice to librivox.org.
- Mine the **data sources** (UN statistics, State of the Future, www.gapminder.org).

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[16] Surowiecki, James (2004). *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations*, and Cass R. Sunstein (2003), *Why Societies Need Dissent*.

[17] For Homer-Dixon, these include, particularly, climate change, energy security, the threat of pandemics, and nuclear terrorism.

[18] In Homer-Dixon, Thomas. (2001). *The Ingenuity Gap: Facing the Economic, Environmental, and Other Challenges of an Increasingly Complex and Unpredictable Future* and Homer-Dixon, Thomas. (2006). *The Upside of Down: Catastrophe, Creativity, and the Renewal of Civilization*

[19] Masum, H. & Tovey, M. (2006). 'Given enough minds: Bridging the ingenuity gap.' *First Monday,* vol. 11, iss. 7, 2006. firstmonday.org/issues/issue11_7/masum/

- Participate in the **blogosphere**, learn how to monetize what you do (http://www.stevepavlina.com/blog/2006/05/how-to-make-money-from-your-blog/). Join (or start!) a **group blog** around your topic.
- Learn how to write like the pros (read *Clear and Simple as the Truth*, *On Writing Well*, and *A Writer's Time*).
- Become involved in **citizen journalism** (indymediaorg, globalvoicesonline.org), or create a **distributed journalism** project (see tinyurl.com/2s9bya for ideas). Create courseware for cnx.org.
- Find **existing communities of interest** and bring them together
- Empower communities by **bundling** relevant open source software.
- **Seed ideas** on whynot.net, halfbakery.com, globalideasbank.org, listible.com. **Ask deep questions** on metafilter.com. Read deep answers at the World Question Center (edge.org/questioncenter.html)
- Get comfortable **editing the Wikipedia** (www.wikipedia.com).
- Make a wiki (http://pbwiki.com). Start your own **Wikia** (wikia.com).
- Explore **systems of deliberation** (openpolitics.ca, issuepedia.com) or start your own. Familiarize yourself with decision-making processes (http://www.dotmocracy.com/, http://www.iit.edu/~it/delphi.html), and decision-support (Steen Rasmussen, Diana Mangalagiu, Hans Ziock, Johan Bollen, and Gordon Keating, *Collective intelligence for decision support in very large stakeholder networks: The future US energy system* — tinyurl.com/223eau)
- Create **sharable visualizations** with public data: tinyurl.com/3btkjm, learn how to display data really effectively: edwardtufte.com, learn how to display really complex data: visualcomplexity.com/vc/.
- Hold global, **multiple-time-zone meetings** and conference calls using Skype or Gizmo, freeconferencecall.com, the worldclock.org meeting planner (tinyurl.com/ytgcp), and Meeting Wizard (meetingwizard.org/).
- Become hip to the world of **Make magazine** (www.makezine.com/).

- See what the TEDsters have to say about collaboration: http://www.ted.com/themes/view/id/19
- Find (or found!) a **free media lab** (www.mongrelx.org/?q=gyoml)
- Help bring laptops to the world's children (laptop.media.mit.edu/)
- Sponsor a **FabLab** (fab.cba.mit.edu/) in an under-served location.

Workaday practices: specific domains of interest

- **Music**: Lay down some grooves on cc:mixter (ccmixter.org/), start a free culture record label, organize a global synchronized listening party (everyone downloads a playlist and starts their mp3 player simultaneously, and then all wander through beautiful places in their part of the world).
- **Programming:** get an XO laptop (One Laptop Per Child) and write apps for it. Write FaceBook or Web 2.0 apps[20] that make it easier for people or companies to coordinate sustainable practices.
- **Art**: Share meaningful work on deviantart.com/ or flickr.com/. Curate an art show of artists from around the world. Bonus: do it in Second Life. Derive inspiration on how to display the large-scale from Chris Jordan's Running the Numbers (chrisjordan.com/), or Ed Burtynsky's photographic works (edwardburtynsky.com/)
- **Finance**: Explore the world of **peer-to-peer micro credit** (kiva.org) and **currency democracy** (ripplepay.com, tinyurl.com/yp5jdu) as a way to understand paradigm-shifting technologies. Check out the *Interra Project* chapter in this book.
- **Community**: Start a **free wireless hotspot** that informs people about their neighborhood: http://www.ilesansfil.org/tiki-index.php?page=Projets.
- **Science and technology**: Replicate innocentive.com in your area.

[20] See Segaran, Toby. (2007). *Programming Collective Intelligence: Building Smart Web 2.0 Applications.* O'Reilly & Associates.

- **Government or politics**: See http://www.mysociety.org/projects, http://www.howdtheyvote.ca/, and openpolicy.ca.
- **Transparency**: Read *Why Congress Needs a Version Control System*: radar.oreilly.com/archives/2007/07/why_congress_ne.html, by Tim O'Reilly, and investigate the transparency mashups at www.sunlightlabs.org. See Ethan Zuckerman's blog entries on *Tools for Open Government* (http://tinyurl.com/ypz234), and *Towards the principles of open government data* (http://tinyurl.com/3daaaf).
- **Bias**: Familiarize yourself with the various kinds of cognitive bias (http://en.wikipedia.org/wiki/List_of_cognitive_biases) and how to counter them (Surowieki's *The Wisdom of Crowds*). Develop tools which contribute to media democracy.
- **Open Data**: Investigate http://datalibre.ca/ ("urging governments to make data about Canada and Canadians free and accessible to citizens") and http://civicaccess.ca/
- **Envisioning the Future:** For a compelling example of collaborative foresight, see worldwithoutoil.org/ (and the feature on Jane McGonigal at: salon.com/tech/feature/2007/07/10/alternative_reality_games). See also the chapter in this volume, *State of the Future 2007*.
- **Taking action**: Look at savetheinternet.com, avaaz.org and changemakers.net for very successful and credible models of how it can be done. pledgebank.com has a system for taking actions together, as does razoo.com.

Building a prosperous world at peace: strategies for change

How can we build the world we want, quickly, and in a way which is as inclusive as possible? Changing the world is difficult work[21], even with many minds engaged in the problem. Technology and global culture have created unprecedented problems, but they also offer unprecedented remedies.

Advanced strategies for the global practitioner

[21] Bornstein, David. (2003). *How to Change the World: Social Entrepreneurs and the Power of New Ideas*. New York: Oxford UP.

The world has a new tool-kit. How to use it?

- Identify the **disruptive applications of the future**. Build them, or have them built. Open source them. Watch the world alter.
- **Establish collaboratories** to solve key problems. Solve them.
- Determine where the costs are too high. Lower them.
- Inspire the opening up of **closed information silos**, at national and international levels[22]. Get the facts, and allow everyone else to get them too. Make them easily visualizable. Encourage evidence-based policy.
- Identify the as yet undiscovered win-win-win practices in your sector and the infrastructure necessary to make them possible.
- Study the methods in The Change Handbook and The Tao of Democracy. Figure out how to scale them up.
- Design systems of effective **deliberation, coordination, and cooperation** for everyone in your domain of interest.
- Work out the principles of having Difficult Conversations[23] about what you care about at a societal level. Have them.
- Discover **a generative class of human knowledge** that has never been aggregated. Aggregate it. Generate it.
- Design communities of practice that don't yet exist. Figure out the tools necessary to empower those practices. Make them.
- **Seed a field** by writing a paper laying out the issues for a brand new area of inquiry, ala Robert Trivers[24]. Watch the world flesh it out.

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[22] You can see this approach in various forms in the work of Hans Rosling (http://www.gapminder.org), Robert David Steele Vivas (http://www.oss.net), and Brian Eddy (http://www.carleton.ca/geography/faculty/eddy.html).

[23] http://www.pon.harvard.edu/hnp/

[24] Robert Trivers in Edge: "… one of the virtues of thinking a topic through to some degree of development is that you will generate a literature which will come back and illuminate the topic for yourself. Even if you're thinking in purely self-interested terms

- Given a paradigm that isn't possible with the current infrastructure, **figure out what infrastructure would make it possible**, and cause it to come into existence.
- Familiarize yourself with Donella Meadows' **Twelve Leverage Points to Intervene in a System**.[25] Apply leverage. Transcend a paradigm. Extra credit: find an additional point of leverage.

and write a paper on reciprocal altruism, there's a huge literature now on the subject. Only part of it is generated from that paper, but still a good part was generated from that paper, and I learned back from it." (http://tinyurl.com/26ypl6)

[25] http://www.sustainabilityinstitute.org/pubs/Leverage_Points.pdf

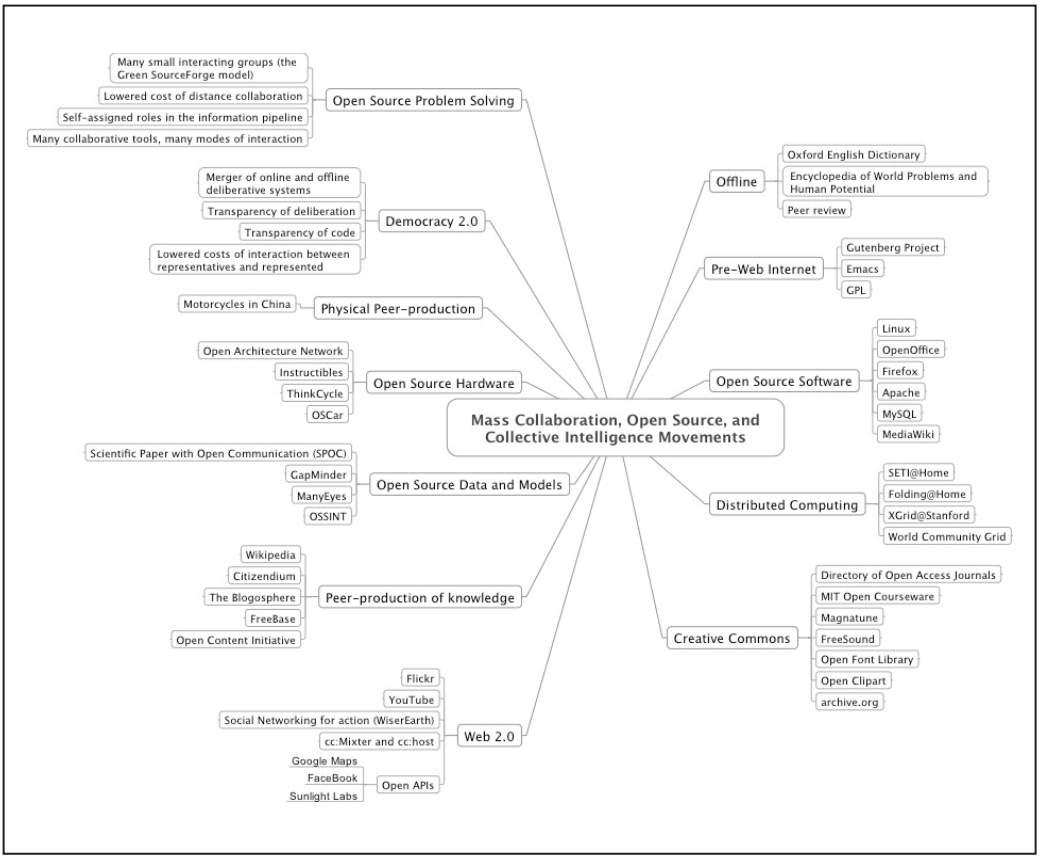

Figure 1. Historical, current, and potential movements in mass collaboration, open source, and collective intelligence

Interview with Thomas Homer-Dixon

Hassan Masum[1]

Why is Thomas Homer-Dixon so worth listening to? There are many writers out there taking on energy issues: David Goodstein on peak oil, Paul Gipe on practical wind power, Vaclav Smil on energy systems. Society's robustness to breakdowns? Jared Diamond and Joseph Tainter. Climate change? Al Gore and Nicholas Stern. Biodiversity and environmental damage? Some favorites are Red Sky at Morning, Something New Under the Sun, and the Millennium Ecosystem Assessment. The inappropriateness of focusing on GDP as the default measure of progress? That's an interesting one, with an intermittent thread of scholarship through the last 40 years, such as Scitovsky's The Joyless Economy, Hazel Henderson, Herman Daly, and some recent Ecological Economics. But there are few if any authors writing books that cover this whole range of topics in a sensitive, contextualized, way.

In his new book, The Upside of Down, Thomas Homer-Dixon does just that. Many of us here at Worldchanging[2] liked his previous book, The Ingenuity Gap. This book takes a longer-term view of how we can navigate successfully through societal breakdowns, leaving societies stronger and more resilient.

We wanted to know more about the man behind the book, so he and I sat down for a conversation (distilled below). —HM

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[1] After postdoctoral research and stints with government, engineering firms, and the National Research Council of Canada, Hassan Masum is now Senior Research Co-ordinator with the McLaughlin-Rotman Center for Global Health in Toronto and a contributor to WorldChanging.com. www.hmasum.com.

[2] This is an edited portion of a longer interview originally published on Worldchanging.com on November 13, 2006 4:07 PM, and reprinted here by permission. http://www.worldchanging.com/archives//005131.html

Hassan Masum: With regard to the potential of online tools, what do you see as the next simple step beyond transmitting and sharing information?

Thomas Homer-Dixon: One thing we need to achieve is winnowing—we need to increase the signal to noise ratio. But it has to be a democratic process—you can't have people on the outside saying "I like this idea but I don't like that idea, this idea is going forward and that one isn't." Instead, it needs to be internally legitimate, in the sense that the community as a whole decides what ideas are going to be winnowed out, and what ideas are going to go to the next stage.

One of the remarkable things about the Wikipedia environment is that there seems to be a general accumulation of quality—entries tend to improve over time. I had occasion when writing this book to go and look at the entries on thermodynamics, and they were terrific, but I'm sure they're not the result of a single person's contribution. Many people have been contributing, and the quality over time has improved.

I don't think anybody except the diehard advocates would have predicted, 5 or 10 years ago, that you would have been able to have an information source of such high quality that was produced entirely by volunteers, collaboratively. So there is a winnowing and accumulation of quality process there that's very effective. But, and here's where Wikipedia seems to run into trouble, there's the hijacking problem. Especially when you have morally fraught issues, or issues that have strong value conflicts or connotations for people—capital punishment, abortion, the nature of capitalism, some celebrities doing things that annoy people a lot. You get so many divergent interventions that you won't come to a consensus in terms of the entry, and what they've had to do is implement a series of protocols for cooling off discussion or limiting the range of people who can intervene.

Hijacking tends to happen when issues are value-fraught, and a lot of the problems that I think we need to address within an open-source democratic framework will be value-fraught, and so they're going to be vulnerable to hijacking by small groups of highly motivated and not terribly tolerant people who are fixated on one idea, one solution, or one enemy.

When it's possible to replicate your voice easily with the push of a button, hijacking becomes much more of a problem than it does in a personal conversation or a room. It's like somebody in a town hall meeting getting hold

of the microphone, and nobody can take it away. So in terms of the institutional design, there needs to be a capacity to legitimately reduce the risk of hijacking, and sideline people who aren't prepared to engage in a cumulative winnowed conversation over time about a particular problem.

I think this is a very important institutional requirement for an open-source democratic decision-making system for dealing with complex social problems. Another is the relationship between lay people and experts. Some of the most difficult problems we're facing—climate change, energy—are technical problems that are enormously complex, and it's very easy for experts to just take over the discussion.

In fact, when I was having a conversation with Paul Martin (the former Canadian Prime Minister) about this issue at one point—this was before he became Prime Minister, and before he was even leader of the Liberal Party—I had a conversation about open-source problem solving[3]. I said, you know, we have this difficult health care problem in Canada—wouldn't it be remarkable to have a hundred thousand people involved in thinking about how to solve that problem? And his first reaction was, well, my thinking would be to get the twenty best experts in the world around the table for a conversation.

Experts certainly have a role, but they can hijack the agenda and deprive the whole process of legitimacy just because they have so much knowledge. So one of the problems with democracy that we have in the world right now is that people just don't think it achieves anything for them—that's why you get participation declining so dramatically in many Western democracies. I think this kind of open-source institutional environment could give people a sense of participation that would be very valuable, but the relationship between the experts and the lay people is critically important. The experts have to provide the information that allows lay people to make informed decisions, without taking over the process.

So I see the relationship of experts to decision-making, and the problems of accumulation, winnowing, and hijacking at the centre of figuring out the institutional design for open-source democratic decision-making.

[3] The full text of this conversation between the Rt. Hon. Paul Martin and Thomas Homer-Dixon can be found as the Afterword to this book, "The Internet and the Revitalization of Democracy," and on the internet at http://www.homerdixon.com.

HM: Interesting. One issue is that it's easy to have a process where one feels as if one's participating, without actually having input into the final solution. So I'm trying to picture any kind of large institution where we've had 10 000 people, or even 1000 people, giving ideas and had them filtered and used in a way that is actually democratic. Any examples?

TH: No, not really... But Wikipedia's interesting—there are some very smart people who spend a huge amount of time creating entries, monitoring entries, making sure the system works OK. They're not well known, they don't get their name put up in lights, but they serve a very important social function within this apparatus, as a kind of glue that holds the system together. It's a voluntaristic culture—not particularly egocentric or narcissistic, like much else on the Web. So that's the kind of culture we want to create.

Now people still need to feel that they're being listened to and that they can make a difference, but they need to understand that it's a meritocratic system, that there's a legitimate mechanism for improving the quality of ideas over time, and that maybe their idea won't get forward or maybe only a little portion of their idea will morph its way through to the end. I think most people are remarkably responsive if they feel they're actually being listened to—that they're not just saying something and it disappears into a void, which is the way so many of us feel with our contemporary democracy. You write a letter to your Member of Parliament, and you get a form letter back, and what difference does it make? Better than not getting any answer at all, but you don't really think you're making any difference.

One of the things about Wikipedia is you can see what's going on. You can see the conversations, you can see who the people are—in many cases they put up their names—and that leads to a certain transparency. If you want to see the genealogy of certain ideas, you can archive the whole discussion, see how it's been discussed, see the whole process...

HM: Trace it through time.

TH: Trace it through time, exactly. And if somebody says, I made no difference, then you can say, well let's go back and look at the history—here's a point where someone raised an argument which was decisive in the face of your idea, and your idea just dropped out of the process. Or you might say, well look, your idea contributed to this thread of the discussion, and there it is right there, there's a little bit of it still remaining...that's how it influenced it. In

either case, you can't possibly say you had no influence—even in the first case when your idea met a counterargument and dropped out, it still was an important component for the progress of the discussion beyond that point.

And I think ultimately, that's all people want. It's like the person working on the line—a lot of manufacturers have found (and the Swedes in their Volvo plants realized this early on) that it's important to provide some power on the line, so that people who are working in the interstices of the system, the fine-grained detail of the system (building cars in this case) can say, this set of procedures isn't working. This is a problem that's costing us money, it's dangerous, it's reducing the quality of the end product.

And they can bring that into a larger discussion, and then there can be a conversation about how to solve that. Sometimes it might involve fairly large changes in the overall structure of the system, but it's the people on the line who frequently have the best knowledge about why things are going awry. And what I suggested to Paul Martin is that you need to provide those people with the opportunity to make their suggestions. And as long as they think they're being listened to, even if their suggestions don't go anywhere because somebody comes up with a better idea, I think they'll feel much more a part of the system, and they'll be eager to participate.

HM: It would be interesting to have a way of routing those suggestions to the place where they'd do the most good—some sort of "reverse Google", in a way.

TH: Right, that's an interesting idea. But (just to make a jump) the underlying ontological assumption here is that there are emergent properties of these systems—that you can get a lot of people together, and if the institution's designed properly, the intelligence exhibited by the whole is larger than any one individual of the whole.

Unfortunately, I think what's happening with many of our decision-making institutions now is that we're not seeing positive emergence but "negative emergence": the intelligence of the whole is less than any of the individuals. Our societies behave like beasts, frequently—with no thought for the future, often extremely violently, with very little moral or ethical guidance or conscience, and what we want to do is reverse that.

To me, this is about institutional design—it's fundamentally a collective action problem. The greatest things that humankind has ever accomplished have been

accomplished by an institutional design that gets people working in the same direction, in ways that are very creative, so that resources and ingenuity are effectively mobilized.

HM: How important do you think it is to have ways of seeing patterns that are not obvious? For instance, you talked about society acting "like a beast"—that might be apparent to you having thought about it...

TH: Well, it's a really important question, and there are a couple of things here. In some respects that question is about values, and in some respects that question is about facts. My interpretation of a society behaving like a beast is first of all a values judgment. I think Guantanamo is beastly behavior on the part of the United States—it's morally bankrupt, and it's also not at all supportive or helpful to the enlightened self-interest of the United States—it's counterproductive, just in a purely narrow political sense.

There are two things happening there. First of all I'm making a value judgment, based on a certain moral code, and that's something that people may well not share—they might come up with a different set of values where the behavior in this case is entirely legitimate, entirely reasonable, and morally appropriate. Now that's an important discussion. We may not be able to resolve our value differences clearly, but we certainly need to be able to understand them better, and see if there's a possibility for some kind of overlap or consensus from which we can build to arrive at a solution.

But the second part of my statement, when I say this is beastly behavior, is in a sense a factual judgment about the consequences of this behavior for American society. It turns people against the United States, it's making American foreign policy a lot harder, it's making Americans more vulnerable to terrorist attacks because it makes so many people angrier in the world and hate the United States. Now that's not a value-based judgment—it's an assertion about the facts on the ground and their consequences. That's something we can have a factual discussion about, and at this point we can bring some experts in.

On the value judgments, the experts can participate a little bit, the moral philosophers can participate, but much of that discussion you can have without the involvement of experts. Yet it's important on the non-value side, on the factual side, that we can have foreign-policy experts from other areas saying, "This is what this policy has done in the Muslim world. This is how they

interpret it, this is how they see it." And that input can have a very important role in us understanding factual, functional consequences.

Our ultimate decision about this foreign policy has to involve both components: the "ought" and the "is". And it seems to me that an open-source environment could provide the framework within which that's done, if you get the institutional design right. I'm not saying you're going to reach an agreement on everything, but you're certainly going to understand where the points of disagreement are much better, and then you might be able to find "kludges" (to use that old computer science word)—ways of living with those disagreements that allow you to get on and do something everybody agrees is worthwhile.

HM: A sort of state of maximal consensus. And in fact one might hope to find a way of mapping out these factual consequences in a way which was adaptive and predictive, so you could actually see them visually.

TH: Yes, although I'm persuaded enough by complexity theory and so forth that, as I say in my book, I think our capacity for prediction is very limited. But you can certainly define a rough boundary between plausible and implausible.

And scenario development is really important in this—part of the factual exploration would be thinking about possible scenarios for the future. What is Guantanamo and like foreign policy going to do for American well-being in the world, and the well-being of humankind as a whole? And you could chart out a range of scenarios from positive to negative, and have a very vigorous debate about whether those scenarios make sense or not.

Again, if you've got the winnowing and accumulation institutional design, you might be able to come out with five or six scenarios which distill the essence of the debate, and that could have very useful policy implications.

And then you could see your values and the value discussion in the context of those scenarios, and it provides a much more powerful framework for thinking about what decisions we're going to make, and coming to some consensus on those decisions.

HM: What do you see as being some low-hanging fruit for individual action on these kinds of issues?

TH: I've been thinking about this...I would like to see some beta-testing of these institutional designs pretty quickly. I think you need to start with a couple of tractable problems.

One potentially tractable problem that we've thought about here is to design better indicators of social well-being, i.e. alternatives to GDP. It's a technical problem, so experts have to be involved. It also involves complex value issues; it involves complex ontological problems about how you aggregate data and things like that. And we thought of using that task of beta-testing an open source environment to explore the development of alternative GDP indicators—we have a paper about a methodology for comparing alternative social well-being indicators, looking at a large number of them.

There might be only a few dozen people in the world involved in this exercise, but it would allow us to figure out how to make them work together. Have some of our students involved who aren't experts, and have some experts involved—then you have to work out the interfaces, to make sure the experts are providing enough information but are not dominating the process, along with all the challenges I discussed before.

To me, development of alternative social well-being indicators is a very important stage in this overall process, because if we shift from GDP to something else it lengthens the "shadow of the future"—it gives us a tighter, more obvious connection to future generations and to other biota on this planet. That can change the discourse really dramatically—change the whole calculus of values and factual assumptions within which we see human behavior.

It's the kind of thing that's very complex, hard to wrap your head around, and maybe we can create one of these open-source environments where the whole is more than the sum of its parts. So that any expert coming in ends up going away with knowledge that could never possibly have been generated just by that expert, or even with a few other experts together; so that the whole is producing something that is much more valuable than any sub-cluster of people could produce.

HM: That's an excellent idea! And I like too the fact that you're actually, in the process of doing this, looking at how you're doing it, and therefore improving the process of tackling similar problems in the future.

TH: Right. If the process works, you learn something about architectures for open-source problem-solving, but you also get some real progress on designing indicators for social well-being.

Achieving collective intelligence via large-scale argumentation

Mark Klein[1]

Let us define "collective intelligence" as the synergistic channeling of the efforts of many minds towards identifying and coming to consensus over responses to some complex challenge, i.e. as large-scale deliberation-for-action[2]. How well does current technology enable this? We can divide existing deliberation support technologies into three categories: sharing tools, wherein individuals compete to provide content of value to the wider community; funneling tools, wherein group opinions are consolidated into an aggregate judgment, and argumentation tools, wherein groups identify the space of issues, options, and tradeoffs for a given challenge[3].

By far the most commonly used technologies, including wikis, blogs, idea markets, and discussion forums, fall into the sharing category. While such tools have been remarkably successful at enabling a global explosion of idea and knowledge sharing, they face serious shortcomings. One is poor *signal-to-noise* ratios. Such tools, especially forums, are notorious for producing repetitive and mixed-quality content. Sharing systems do not inherently encourage or enforce any standards concerning what constitutes valid argumentation, so postings are often bias- rather than evidence- or logic-based. Sharing systems are also challenged when applied to *controversial topics*: they are all too easily hijacked by a narrow set of "hot" issues or loud voices, leading to such phenomena as forum "flame wars" and wiki "edit wars". Sharing tools are thus ill-suited to uncovering consensus.

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[2] Walton, D. N. and E. C. W. Krabbe (1995). *Commitment in dialogue: Basic concepts of interpersonal reasoning*. Albany, NY, State University of New York Press.

[3] Moor, A. d. and M. Aakhus (2006). "Argumentation Support: From Technologies to Tools." *Communications of the ACM* 49(3): 93.

Funneling technologies, which include group decision support systems, prediction markets, and e-voting, have proven effective at aggregating individual opinions into a consensus, but provide little or no support for identifying what the alternatives selected among should be, or what their pros and cons are.

Argumentation tools fill this gap, by helping groups define networks of *issues* (questions to be answered), *options* (alternative answers for a question), and *arguments* (statements that support or detract from some other statement)[4]

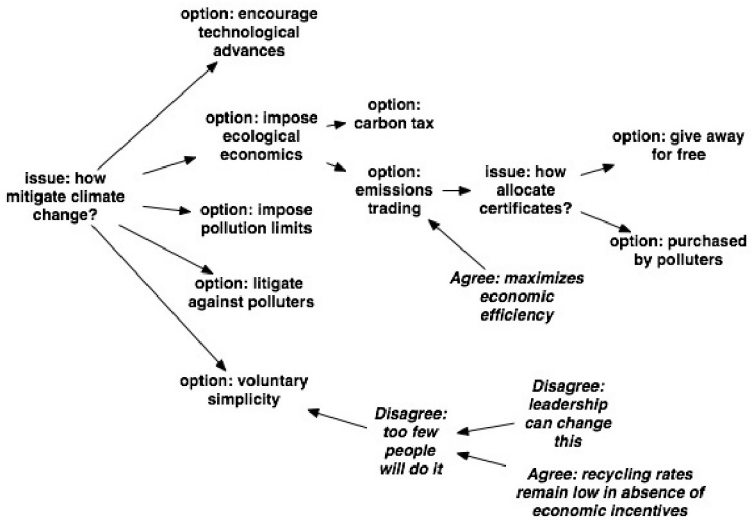

Figure 1. An example argument structure.

Such tools help make deliberations, even complex ones, more systematic and complete. The central role of argument entities implicitly encourages the users to express the evidence and logic in favor of the options they prefer. The results are captured in a compact form that makes it easy to understand what has been discussed to date and, if desired, add to it without needless

[4] Kirschner, P. A., S. J. B. Shum and C. S. C. Eds (2005). "Visualizing Argumentation: Software tools for collaborative and educational sense-making." *Information Visualization* 4: 59-60.

duplication, enabling synergy across group members as well as cumulativeness across time.

Current argumentation systems do face some important shortcomings, however. A central problem has been ensuring that people enter their thinking as argument structures – a time and skill-intensive activity - when the benefits thereof often accrue mainly to *other* people at some time in the future. Most argumentation systems have addressed this challenge by being applied in physically co-located meetings where a single facilitator captures the free-form deliberations of the team members in the form of an commonly-viewable argumentation map[5]. Argumentation systems have also been used, to a lesser extent, to enable non-facilitated deliberations, over the Internet, with physically distributed participants[6,7]. With only one exception that we know of[8], however, the scale of use has been small, with on the order of 10 participants or so working together on any given task, far less than what is implied by the vision of collective intelligence introduced in this paper.

Towards Large-Scale Argumentation

We hypothesize that effective collective intelligence that transcends these limitations can be achieved by creating *large-scale argumentation systems*, i.e. systems that integrate sharing and argumentation technologies to enable the systematic identification of solution ideas and tradeoffs on a large scale, and then use funneling to help participants come to consensus about which of these solution ideas should be implemented for a given problem. Creating such large-

[5] Shum, S. J. B., A. M. Selvin, M. Sierhuis, J. Conklin and C. B. Haley (2006). *Hypermedia Support for Argumentation-Based Rationale: 15 Years on from gIBIS and QOC*. *Rationale Management in Software Engineering*. A. H. Dutoit, R. McCall, I. Mistrik and B. Paech, Springer-Verlag.

[6] Jonassen, D. and H. R. Jr (2005). "Mapping alternative discourse structures onto computer conferences." *International Journal of Knowledge and Learning* 1(1/2): 113-129.

[7] T., V. Ratnakar and Y. Gil (2005). "User interfaces with semi-formal representations: a study of designing argumentation structures." *Proceedings of the 10th international conference on Intelligent user interfaces*: 130-136

[8] This exception (the Open Meeting Project's mediation of the 1994 National Policy Review) was effectively a comment collection system rather than a deliberation system.

scale argumentations systems will require, we believe, coming up with novel solutions to a range of key design challenges, including:

Who can edit what? This has been handled in a wide range of ways in different collaborative systems. Wikis, for example, typically allow anyone to change anything, where the last writer "wins". In chat, email, and threaded discussion systems, every post has a single author; people can comment on but not modify submitted posts. Each scheme has different pros and cons. Which scheme is best for large-scale argumentation?

How do we ensure a high-quality argument structure? In an open system, we can expect that many participants will not be experts on how to structure argument networks effectively. People may fail to properly "unbundle" their contributions into their constituent issues, options, and arguments, may link them to the wrong postings, or may fail to give them accurate titles. Different people may also conceptually divide up a problem space differently, leading to the possibility of multiple competing issue trees. The sheer volume of postings may make this redundancy less than obvious, and no single facilitator can be expected to ensure coherence since he/she would represent a bottleneck in a large-scale system. Getting the structure right, however, is a critical concern. A good structure helps make sure that the full space of issues ideas and tradeoffs is explored, and substantially reduces the likelihood of duplication.

How do we mediate attention sharing? In a small-scale face-to-face setting, it is relatively straightforward to guide the group en masse through a systematic consideration of all the issues. Facilitators often play a key role in this. In a large-scale system, however, users may follow their own agendas, important issues may go neglected, or discussions may become balkanized, with sub-groups each attending to distinct parts of the argument structure without interacting with each other. People, in addition, typically generate ideas by extending or re-combining ideas previously proposed by others. Our goal should be to maximize such potential synergy by helping them encounter a wide range of 'fertile' ideas. The requisite networked interaction is straightforward to ensure in small physically co-located meetings: how can we achieve it with large distributed settings, where communication often devolves into a broadcast topology?

How do we enable consensus? In small-scale argumentation systems, consensus (i.e. about which of the proposed ideas should be adopted) emerges off-line via

the face-to-face interactions amongst the participants, but in a large-scale system, this consensus-making needs to be mediated or at least be made discernible by the system itself. Funneling systems can address this gap, but to date have been applied mainly to identifying consensus (e.g. by voting) with a relatively small number of pre-defined, mutually exclusive options. Large-scale argumentation systems introduce new challenges because they define not just a few options, but rather an entire (and generally vast) *design space*. An argument tree with only 10 orthogonal issues and 10 (non-mutually-exclusive) options per issue produces, for example, (2^10)^10 (over 10^30) possible solution options. The utility functions for these vast spaces will generally be diverse (different stakeholders will have different preferences) and nonlinear (with multiple optima). A large-scale argumentation system must thus support, in other words, a collective nonlinear optimization process. This is not a 'problem' with argumentation systems, but rather a result of their ability to represent the inherent complexity of systemic problems.

The Collaboratorium

We have implemented and are evaluating an evolving large-scale argumentation system, called the Collaboratorium, which explores how we can address the issues identified above. The Collaboratorium is a web-based system designed for concurrent use by substantial numbers (tens to, eventually, thousands) of users. The primary interface for a user is the "Discussion forum" (Figure 2), which allows users to create, view, edit, comment on, and organize posts (issues, ideas, pros, and cons) in the argument structure. The Collaboratorium incorporates functions that have proven invaluable in large-scale sharing systems, including email, user home pages, watchlists, search functions, browse histories, and so on.

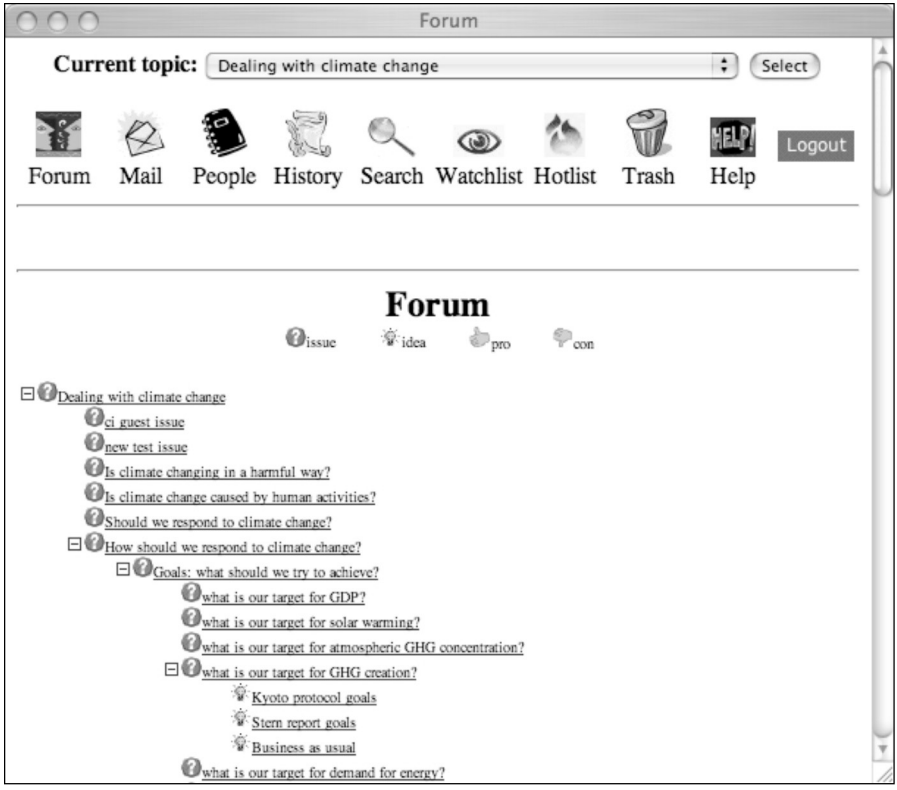

Figure 2. The Collaboratorium discussion screen

The Collaboratorium design addresses the issues mentioned above as follows:

Who can edit what? The wiki "anyone can change anything model" is powerful because it helps ensure that diverse perspectives are incorporated and content errors are corrected. But it also has some weaknesses. Uninformed authors can overwrite expert contributions, which can discourage content experts from participating. Credit assignment for good articles is muddied because of the open authorship, making it harder to identify who is expert in which domains. And controversial topics, as we have noted, can lead to edit

wars as multiple authors compete to give their own view pre-eminence in a post. The forum "one author many commentors" model, by contrast, encourages expert commentary, but the community has much less opportunity to impact the quality of a post. The Collaboratorium explores a design choice between these alternatives. In our current system, only the creator of a post, or his/her assigned proxies can edit a post. Other users can submit suggestions to be considered for incorporation by the authors. Anyone can rate a suggestion, providing guidance on which ones are most critical to incorporate. This approach has several important advantages in the context of large-scale argumentation. Since each post represents just one of many possible perspectives, it is less critical to ensure fully open authorship. Each post need only express a *single* perspective as clearly as possible, enriched by community feedback. This approach should radically reduce the likelihood of fruitless 'edit wars', since users with divergent perspectives are not forced to compete for dominance in a single post.

Ensuring a high quality argument structure: The Collaboratorium is designed to support a *continuum* of formalization, allowing people to enter content in the form that they are comfortable with, be it simple prose (in the form of comments) or fully-structured argument maps. It also provides search tools that help users find the issue tree branches on given topics, and provides information on the relative activity of these branches (more active branches are displayed in a larger font), so they can find the *most-attended-to* of the places that their post could belong. Editors, a special class of users selected based on their argument mapping skills and ability to maintain a content-neutral point of view, are empowered to [re-]structure these entries, if necessary. This is analogous to what often happens in Wikipedia and it's offshoots: some people focus on generating new content, while others specialize on checking, correcting, and re-organizing existing content. We are also exploring the idea of relying upon a small cadre of domain experts to create an initial argument structure carefully designed to present the critical issues and options in an intuitively organized way. This "skeleton" can then be fleshed out and, if necessary, modified by the full user community.

How do these design choices help? We hypothesize that a well-defined initial issue structure, used in conjunction with search tools, should help ensure that users usually put posts in the right part of the issue structure. Editors can

re-structure and re-locate posts that are misplaced. Experience with sharing systems has shown that people are strongly motivated to make those kinds of "meta-level" contributions if this offers them entry to a visible merit-selected class of users with special privileges. We also hypothesize that the activity scores maintained by the system will help the user community converge on a consensus argument structure. There are often many different ways that people could organize a given body of ideas, and in an open system several competing structures may appear within the same argument tree. Users will presumably want to locate their posts, however, in the argument branch that is *most active*, because that maximizes their opportunities to be seen and endorsed. This should produce a self-reinforcing push towards consolidation in the argument trees used in a given discussion.

Mediating attention sharing: The Collaboratorium helps mediate community attention by maintaining an activity score for all postings, and makes it visually salient. Our hypothesis is that making activity information salient will create a self-reinforcing dynamic wherein "fertile" parts of the argument tree (i.e. ones where people are generating lots of new content) are more likely to get attention and thereby be "exploited" rapidly, much in the same way that pheromone trails allow ants to rapidly exploit food sources.

Enabling consensus: We can generate, as we have noted, many possible solutions from an argument structure, by combining the ideas therein in different ways. The challenge is to identify which combination of ideas best satisfies which goals. The Collaboratorium supports this by providing distinct "goal", "idea" and "proposal" branches in the argument structure for every topic. Positions in the scenario branch are distinguished by the fact that they represent a specified combination of ideas from the *other* branches in the argument structure. The system enforces the rule that all scenarios are mutually exclusive (i.e. represent distinct combinations of positions), so that the scenario with the highest quality score represents the one that the community has selected as the "winner".

Next Steps

The Collaboratorium represents the latest of a series of argumentation systems developed by the author over a period of 15 years (Klein 1997). The current system has been used extensively by the developers to capture their deliberations concerning how it should be designed, leading to an argument tree

with roughly 400 postings. Our next steps, currently under way, are to evaluate the Collaboratorium with larger numbers (hundreds) of users. Two different tests are being conducted. One uses a "bare" system (without any pre-existing argument structure) to enable a discussion about what policies can best foster technological innovation in Italy. The second test enables a discussion about how humankind can respond to climate change challenges, building upon a pre-defined argument "skeleton" developed with the help of experts on technology, policy, and climate issues. We will analyze the effectiveness of these interventions using such measures as breadth of participation, quality of the solutions selected by the participants, and speed of convergence.

Contributions

The key contribution of this work involves exploring how argumentation systems can be scaled-up to enable effective collective intelligence, by adapting ideas that have proven highly successful with large-scale sharing and funneling technologies. A central issue is whether - given the surprising slow pace of adoption of small-scale argumentation systems – we will find that successful large-scale systems are even more elusive. This is an open question for now. One could argue, however, that in some ways large-scale systems have more potential than small-scale systems. There is widespread disaffection with the signal-to-noise ratio of current tools for mediating large-scale deliberations. It seems clear that the number of distinct issues, options, and arguments in a discussion will grow, after a certain point, much more slowly than the number of participants. The qualitative increase in succinctness offered by an argumentation system at large scales may thus prove quite compelling. User's incentives for meta-level contributions such as argument mapping almost certainly will increase as the system scales: people have the sense that their work has a bigger potential impact. A final point is that the kind of explicit argumentation enabled by argumentation tools may make much more sense for large-scale public debate than for smaller group settings where relationship management is primary. In the latter case, implicit least-commitment communication becomes paramount, and a tool that makes commitments explicit can become a liability, rather than an asset.

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Scaling up open problem solving

Hassan Masum[1] and Mark Tovey[2]

What would a sustainable open infrastructure dedicated to finding solutions to the world's toughest problems look like? It would have to lower boundaries to make more use of non-specialists. It would have to be so much fun that using it becomes a natural and widely accepted custom.

We look at two case studies that we have been involved with: developing strategies for dealing with peak oil scenarios, and contributing to the online magazine WorldChanging. Our challenge is to make a problem-solving infrastructure open to interested citizens willing to share their knowledge, connections, and commitment to confront common challenges—to evolve a combination of widely available software, open science, and open content that leads to open participation in building our common future.

Though many of the requisite tools already exist, the various modes in which we can interact and leverage them effectively are just being invented, especially as the number of people involved rises. High-performance teams dedicated to achieving Olympic-level competencies in collaboration will be needed for the meta-Manhattan Project that awaits our species this century.

Modes, Motivations, and Massive Solutions

The two experiences of open collaboration efforts we will share could be multiplied a thousandfold—the point is to think concretely about what's involved in scaling up open collaboration. Getting involved in almost any such

[1] After postdoctoral research and stints with government, engineering firms, and the National Research Council of Canada, Hassan Masum is now Senior Research Co-ordinator with the McLaughlin-Rotman Center for Global Health in Toronto and a contributor to WorldChanging.com. www.hmasum.com

[2] Mark Tovey is doing his Ph.D. in the Advanced Cognitive Engineering Lab at Carleton University, and is editor of *WorldChanging Canada*, marktovey.ca

endeavor suggests ideas for making better use of tools, modes of interaction, and motivational strategies to rapidly accelerate what we can do together.

The first step is to understand the available tools. A home PC can now support distributed small-group collaboration in a variety of ways, such as information sharing, discussions, audio conferencing, small-scale video conferencing, and simultaneous editing. With a little organized support, such efforts can be coordinated and interlinked into larger networks of collaboration to produce sizeable outcomes.[3]

But tools are only as good as the way they're used, leading to the idea of "modes": design patterns for productive collaboration. Just as we are used to the idea of a debate or a lecture, we will become used to more complex interpersonal idioms, each with different functionality, "feel", and requirements. Contributing to Wikipedia, engaging in massively parallel brainstorming, or taking part in a multi-site music education and performance session via broadband video[4] are qualitatively new ways of being productive together. Each of these modes holds the promise of radically increased effectiveness for particular tasks.

For many involved in such initiatives, a big part of the motivation to spend so much time and effort solving problems is enjoyment of "productive fun"[5]. We posit that doing something rather than nothing about the tough problems out there is natural for most people, given the right opportunities to be part of the solution. Collaboration only happens with motivation, and making collaborative activities more fun is an easy and high-impact step to take.

Tools, modes, and motivations come together in the search for practical solutions, to help bridge the "ingenuity gaps"[6] our civilization faces. These gaps might be closed by a problem-solving infrastructure at levels ranging from making one's own habits more effective to tackling planetary emergencies.

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[3] Yochai Benkler, 2006. *The wealth of networks: How social production transforms markets and freedom*. New Haven, Conn.: Yale UP.

[4] See Hassan Masum, Martin Brooks, and John Spence. "MusicGrid: A case study in broadband video collaboration," *First Monday*, volume 10, number 5 (May 2005).

[5] Akin to what Csikszentmihalyi calls "flow", with productive output. See Mihaly Csikszentmihalyi. (1993). *The evolving self: A psychology for the third millennium*. New York: HarperCollins.

[6] Thomas F. Homer-Dixon. (2000). *The Ingenuity Gap*. New York: Knopf.

While the consequences of failure can keep any thoughtful citizen awake at night, many are inspired by the idea that positive-sum interactions could be amplified on a global basis.

Peak oil: a Crude Awakening

Given the massive reliance of modern civilization on petroleum and the short time scale to find alternatives, managing the transition to a post-petroleum economy will require vast amounts of ingenuity.[7] Many citizen-led efforts are already underway, such as Energy Bulletin ("a clearinghouse for current information regarding the peak in global energy supply"), Global Public Media ("public service broadcasting for a post-carbon world"), and World Without Oil (a game inviting participants to role-play potential effects of an oil shock).[8]

How do you start tackling a problem of this magnitude in your own neighborhood? Just start. Mark Tovey, one of the co-authors of this article, was instrumental in initiating "Crude Awakening"—a process spawned by the Environmental Advisory Committee for the City of Ottawa, Canada, seeking to develop solutions to impacts of peak oil at a local level, and to encourage other municipalities to start similar processes of their own.

The public forum process was simple but effective. Two local mayors and a city councilor spoke and underlined the message that the search for solutions was a joint effort in generating policy ideas by politicians and concerned citizens alike. The morning was then spent in professionally facilitated breakout groups of 10 to 12 people, each discussing likely regional impacts of peak oil.

Over lunch, while participants mingled and learned from each other and various organizations, their responses were analyzed to identify ten categories of impact. In the afternoon, ten more breakout groups worked on developing solutions in these ten impact areas. The results of this one-day process were written up, and made available to City Council and the public at large in a fifty page report containing many solutions[9]. An attempt was made to set up ten committees to meet regularly in person, but this foundered on the organizational challenges involved. How to carry on the conversation?

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[7] Goodstein, David. (2005). *Out of gas: the end of the age of oil.* New York: Norton.
[8] See www.energybulletin.net, www.globalpublicmedia.com, and www.worldwithoutoil.com .
[9] www.crudeawakening.net/townhallforum.htm

Tovey set up an open source idea generation facility, using the WhyNot engine created by Barry Nalebuff and Ian Ayres at Yale[10]. WhyNot invites users to contribute seed ideas motivated by the question "why not?", as in "why not do it this way?" or "Why don't we try this?" Other users can then comment, expand, or extend ideas, or even fund or build them. Since systems like this require seed content to be successful, the fifty pages of existing solutions were used to populate the WhyNot[11].

Along with identifying solutions for Ottawa, a meta-goal was to provide a replicable process which other cities could use; the Ottawa public forum spawned a similar process in London, Canada. Going forward, results from many cities could be merged in a WhyNot or similar facility. Given the many thousands of municipalities with the human resources to tackle these issues, having even a few cities or towns running parallel processes—and sharing best practices and outcomes with each other—will help scale solution processes up to the level required to tackle the peak oil problem as a whole.

This exercise suggested concrete morals for scaling up collaboration:

- A distributed process can decompose large problems into smaller ones.
- Moderation, facilitation, or some other structure that keeps people's contributions constructive is crucial: the goal is to keep the discussion moving in a way which produces ever more results.
- To keep people motivated and happy, let them self-select their participation and contribution. Offer multiple modes of interaction (e.g. in-person, electronic forum, open source idea generation). Having only one mode is like bringing a hammer as your only tool in trying to solve a problem you don't understand.
- Involve the stakeholders who make the decisions.
- Approach large problems in stages—get a handle on what's going on, and then scale up.
- Social time is important, for food, bonding, and fortuitous interactions.

[10] See www.whynot.net, and the companion book: Barry J Nalebuff and Ian Ayres, (2003). *Why Not? How to Use Everyday Ingenuity to Solve Problems Big and Small*. Boston: Harvard Business School Press.

[11] www.whynot.net/peakoil

WorldChanging

WorldChanging.com works from a simple premise: that the tools, models and ideas for building a better future lie all around us. That plenty of people are working on tools for change, but the fields in which they work remain unconnected. That the motive, means and opportunity for profound positive change are already present. That another world is not just possible, it's here. We only need to put the pieces together.[12]

WorldChanging is an online magazine bringing the most useful tools, ideas, and inspiration for tackling the really tough problems to a mass audience. It has produced a book[13], won several awards, and has a readership in the hundreds of thousands, with a tiny paid editorial staff. Voluntary contributors (including both authors of this article) number several dozen worldwide.

Any organization which styles itself as "worldchanging" has lofty goals to live up to, and every member of the core team is aware of that. There have been many well-received articles published on the site: interviews with nanotechnology ethicists and ecological economists, pointers to effective tools and innovative organizations, reports on organic LEDs and open source in the developing world. What are some of the challenges to doing even better?

WorldChanging faces challenges to open collaboration within its core team, which inspire several principles:

Design as if time is a scarce resource—Many contributions are done on a voluntary basis. But interesting people also tend to be busy people, with demanding careers—finding time to write substantive, original articles is difficult, and all the more so when interviews or research are required.

Support group intelligence and memory—Motivating contributors, sharing ideas about editorial and content direction, collaborating, and having fun together is tough with contributors in three continents. While the core editorial staff is together most days, others have to rely on tools to keep in touch—mailing lists, conference calls, and crossing paths in far-flung corners of the globe amidst other travels. There is an ongoing exploration for better tools, like

[12] www.worldchanging.com/aboutus

[13] *WorldChanging: a user's guide for the 21st century.* (2006). Edited by Alex Steffen. Abrams.

chats, databases, videoconferences, or collaborative editing. The barrier to making use of them is not so much money, as time for setup and participation.

Work hard at finding the right people—Bringing in a greater diversity of contributors, especially from the developing world and different demographics, is an ongoing challenge. Finding contributors who are talented in their own field of expertise, able to write well, willing to contribute for free, and motivated to tackle tough problems is not easy, especially for voluntary efforts where trust is crucial.

Every group needs to eat—Many online collaborative efforts seem relatively costless initially. But once they scale past a certain size, expenses are inevitable, for technical and especially human resources. It's a challenge to sustainably finance a resource valued by thousands but available online for free.

WorldChanging also faces challenges relevant to other large collaborations:

Push the tool boundaries—Navigating the huge back catalog of many thousands of posts is a key usability constraint—there's just so much there, and keyword/category search is not enough. Can collaborative filtering or tagging systems highlight posts the community has recommended? What about "learning paths" that take readers on a guided tour of the best posts in an area?

Connect people and opportunities—The vast majority of visitors read but do not make comments—but from the many comments that are received both on- and off-site, it's clear that some very talented people are reading and enjoying the site. How could they be networked with communities of shared interests and high-quality projects, using few volunteer minutes?

Channel spare hours and minutes—Similarly, adding social components to WorldChanging could fulfill the need for social activity and play, while also producing useful "collaborative byproducts". People enjoy their leisure activities, especially the ones that allow an experience of down-time—open source collaboration is competing with television, video games, science fiction, and a myriad of other not-to-be-underestimated competitors for time. What fun processes could realistically channel a talented reader's "spare minutes"?

Move from talking to doing?—Knowing about good options is only one step toward making them a reality. To get a WorldChanging idea like solar cooking or LED lighting into widespread usage—and we mean adopted by millions of people—there is a whole innovation and production pipeline. At

which points could a voluntary collaboration like WorldChanging accelerate that process?

The broader point is that having ideas is often easy, but doing them is hard. (Adding information technology and consumer products to developing nations is easy, but upgrading infrastructure and human or institutional capital is hard.) Is there a natural next step to take that extends the ease of generating information to implementing solutions?

Collaboration for the many

These two case studies have aimed to demonstrate open collaboration via practical examples. Such collaborations are made possible by the amplifying effect of good tools, and the enjoyment of working in small networks of enthusiastic, talented volunteers. Our goal is to suggest methods that are usable by any motivated citizen. No $1000-a-day consultants, no expensive equipment—just simple tools, some training, and willing partners.

Social tools can be tougher to master than technical ones. They include filtering contributions and contributors to separate the wheat from the chaff, building community and shared goals, motivating contributors to stay involved, linking smaller and larger efforts, and keeping the whole process productive.

The way in which the tools are used is itself critical, and different "collaboration modes" each have characteristic interaction topologies, scale of people involved, and best practices. As a working definition, a mode is a replicable combination of tools, customs, and social intelligence that enhances some desirable aspect of group effectiveness; an example would be the Open Space method for organically evolving engaging workshops[14]. One could think of modes as "social software". Each mode encodes a set of interaction guidelines and problem-solving methods, and just like a word processor or spreadsheet, a particular mode can be applied in many different areas. So two people can use the same mode, or way of working (voice chat and a shared editor, say), to collaboratively edit code, write a paper, or workshop a play.[15]

[14] Harrison Owen, 1997. Open space technology: A user's guide (2nd edition). San Francisco: Berrett-Koehler Publishers.

[15] For more on modes and tools, please see "Given Enough Minds…: Bridging the Ingenuity Gap". *First Monday*, volume 11, number 7 (July 2006).

As the number or participants increases, tools and modes alter, adapt, break, and are replaced. Challenges multiply in structuring open collaboration to accommodate increasing numbers of contributors. Opportunities concomitantly multiply for problem-solving and effective action. To help picture what mass collaboration means, we propose a conceptual tool: the Mass Collaboration Scale, a logarithmic scale indicating roughly what 1, 10, 100… people can accomplish with a concerted effort.

Mass Collaboration Scale

0 = self: make your life more effective, write a book

1 = a small team: found a startup venture, produce a play

2 = hundreds: politicians in governing political party, motion picture team

3 = thousands: operating systems, IPCC climate change report participants

4 = tens of thousands: Manhattan Project, major research university

5 = hundreds of thousands: Olympics, invading Iraq

6 = millions: Wikipedia, rebuilding Iraq

7 = tens of millions: deal with Peak Oil?

8 = hundreds of millions: deal with climate change?

9 = billions = this whole planet: to be discovered…

Massive collaboration: The Meta-Manhattan Project

The gap between significant problems in the world and our ability and commitment to solve them is significant. On the other hand, human beings relish challenges, and given the commitment, the opportunity, and the resources, have shown themselves very capable of innovating. U.S. Congressman Roscoe Bartlett, Caltech professor of physics and vice-provost David Goodstein, John Amidon, and others have been calling for a "Manhattan-style project" to deal with the very significant problems presented by the peaking of oil extraction rates (and subsequent expected drastic oil price rises).[16] Considering that the Manhattan project itself employed a peak of not

[16] See www.energybulletin.net/13881.html, David Goodstein *supra* note 7, and www.energybulletin.net/13461.html (URLs accessed 21 November 2007).

much more than 100 000 workers and far fewer researchers, this is probably an underestimate—a 4 vs. a 6 or 7 on the Mass Collaboration Scale.

Suppose a lot of scientists became concerned about a particular problem[17], and wanted to create a hothouse atmosphere where a variety of disciplines could interact in an accelerated way. What could be accomplished simply by funding a high-end videoconference unit for every department in every research university worldwide? How could non-specialists bring in the ethical and practical side of ideas? What would be required for citizens and scientists to collaborate on tough challenges?

A project to deal seriously with peak oil or climate change, as a "many-Manhattan" problem, would engage so many people that it would have to be largely self-organizing. To help enable this, imagine a "Mode-Mapper" which, given the kinds of things one wants to do and available resources and tools, suggests a relevant set of modes—along with past examples of the modes in operation, successful case studies from a mode-use-library, and so forth.

Many think tanks (in the best, non-partisan sense of the term) exist worldwide, as labs to learn from. But their best aspects have to be married to the many open collaboration ventures that have become widespread, and evolved into "do tanks" that move ideas into applications ranging from open source disaster recovery[18] to scaling up rescue plans for civilization[19].

If you had a billion dollars to put toward a many-Manhattan problem, where would it do the most good? How about a thousand dollars—and a thousand part-time collaborators? How do you build a massive effort from the ground up, and execute on the problem at hand without dissipating resources?

Perhaps a "Massive Collaboration Meta-Institute" could act as an action lab for such questions. It could start by focusing on making collaboration rewarding in small groups with minimal resources. In analogy to Google's

[17] See the *Millennium Ecosystem Assessment* and the *Intergovernmental Panel on Climate Change* for examples of large-scale scientific collaborations tackling key challenges.

[18] Calvert Jones and Sarai Mitnick. "Open source disaster recovery: Case studies of networked collaboration," *First Monday*, volume 11, number 5 (May 2006).

[19] Lester R. Brown, 2006. *Plan B 2.0: Rescuing a planet under stress and a civilization in trouble*. New York: Norton.

strategy of building massive clusters out of cheap components, it could then link “cheap and fast” small group efforts into larger projects (and so on up through several levels). At the largest scales, it could build practical experience in cooperating when our interests and values may appear to differ.

It would collaborate as widely as possible, and creatively fund part-timers, developing world contributors, and non-profits. It might provide low-cost tools, and advice for others engaging in massive collaboration, as an “action research consultancy”. In short, it would be a place where the many great open source tools and open access platforms we already have would feel at home.

We’re humble about the limits of our knowledge, and put these ideas forth as starting points to be refined. But think about how many tasks the globe desperately needs many-Manhattan projects for at the moment, and how much latent human energy could be harnessed through sustained improvement of tools, modes, motivational strategies, and collaborative expertise. The original Manhattan Project was ultimately about building a destructive device of staggering power. It’s up to us to create even larger-scale efforts for more humane purposes.

The Internet and the revitalization of democracy

The Rt. Honourable Paul Martin in conversation with Thomas Homer-Dixon[1]

The 'ingenuity gap' refers to the critical gap between our need for ideas to solve complex social problems and our actual supply of those ideas. The author argues that this has come about because we are suffering from "info-glut"—our brain's capacity to process today's information cannot keep up with the speed in which it comes at us. As a result, we end up spending all our time managing this information instead of generating new and innovative ideas to tackle today's pressing issues.

PAUL: It's good of you to do this.

THOMAS: Well I'm very flattered that you'd be interested in some of these ideas.

PAUL: Well, I really am. In fact I'm very interested for a number of reasons. Number one, I think that your basic thesis strikes home in a number of ways. I'll just tell you two and then I think what I'll likely do is just turn this over to you. Certainly, on the whole, the complexity of the systems that you describe, the complexity of the systems that we've set up and how we interact, I cannot help but agree with you. Although, they are nothing compared to the

[1] This is a transcript of a conversation between the Rt. Honourable Paul Martin, former Prime-Minister of Canada, and MP for LaSalle-Émard, and Thomas Homer-Dixon, director of the Peace and Conflict Studies program at the University of Toronto and author of *Ecoviolence: Links among Environment, Population and Security* (1998), *Environment, Scarcity and Violence* (1999), *The Ingenuity Gap*, which won the 2001 Governor General's award for non-fiction, and most recently, *The Upside of Down* (2006). This transcript is available from Thomas Homer-Dixon's website at http://www.homerdixon.com/conversations.html, reprinted here by permission.

complexity of systems that nature has impressed upon us which we barely understand. So maybe it's just a little bit of the maturation of man. The other thing, of course, that interests me considerably is you're making what I think is probably the strongest argument for democratic reform and a less concentration of power, because a total concentration of power, it seems to me, can't deal with the complexities that you talk about.

THOMAS: Right

PAUL: But there is a slight digression that I would like to sort of pick up on. And that is your comment that the information revolution leads us to more of simply managing information than thinking it through. And I would be very interested in hearing you elaborate on that because, I must say, I think that there's a lot in that point.

THOMAS: Right. Right. Well, basically what we've seen happen in the last several decades is just an astonishing increase in our capacity to generate and deliver information. And really no increase in our capacity to cognitively process that information because our brains are basically the same as they've always been. And so we have tidal waves of information piling up at the front doors of our cerebral cortexes— the way I put it. And I think this is especially true for people who are in decision-making positions—who have demands and streams of information converging on them from every direction. The average person in our society has a sense of being overwhelmed by this information. I am doing some research on this whole issue of "info glut" right now. And when people have too much information they tend to try to do more things and they tend to do them more superficially. They pay less attention to individual chunks of information because they try to move on as quickly as they can to the next one. They tend to overspecialize, or hyper-specialize, to focus in on particular things as a way of controlling the amount of information. And I think in terms of our public policy discourse, the discussions we are having in our society about our problems and how to solve them – whether we are talking about health care or climate change or what have you – paradoxically, the greater amount of information has actually reduced the quality of that conversation. One of the things that I did when I was researching The Ingenuity Gap was I got a research assistant to go out and look at Time Magazine cover stories and op eds in The New York Times and the major research articles at Scientific American and then to take a random selection of these back in 1970 and do the same in 2000 and count the words in each of these and average them. And in

that 30 years, we saw a 40% decrease in the length of Time Magazine cover stories and a 25% decrease in the New York Times opinion pieces. So here we have a world that is more complex, requiring the management of more information, more subtle decision-making, and yet we are providing less opportunities for people to express complex ideas about those problems. I think it is an absolutely critical problem and I see it in lots of places. One thing that I find with my audiences when I am talking about the nature and the changes of our world is that I always strike home with the "info glut" point. Everyone is feeling completely swamped in information and they spend more time trying to find the bit of information that is relevant to them and trying to sort through all the stuff that is not relevant. And so ultimately we become less capable of generating new and interesting ideas because we are spending all our time just managing information. I imagine this makes sense (to you). I have talked to quite a few people who have been in senior levels of political life and this seems to ring home with the practical experience that they have had.

PAUL: That is probably the reason that so many economists try to reduce everything to an equation which is totally opaque, and for precisely the reason that you have given. I mean, what they are trying to look for in an equation is some ability to sort of penetrate everything and reduce it to something that they are capable of understanding, although nobody else is.

THOMAS: Right. One of the things that happens is that people specialize. This kind of information overload tends to cause people to retreat into their narrow disciplines. So we take a problem like climate change or health care (and) you need people from a dozen different professional backgrounds and scientific disciplines involved in trying to understand these problems. And yet, the pressure is for us to focus more on just a small slice of it because we cannot manage the whole picture. So I think from the point of view of social decision-making, we need to think very carefully about how to find people who are good at large-scale understandings of problems and aggregating and synthesizing across lots of different disciplines – pulling together larger patterns, because, if anything, we are moving in the other direction right now.

PAUL: But that, ultimately, is the role of the person who has to prepare public policy and then express it. Is that not right?

THOMAS: Well, I think that it has been, but I am not so sure that it can be in the future. I think that we need to bring the citizen into this process more. We have hyper-empowered citizens now with vast amounts of information at their

fingertips and an amazing ability to organize and mobilize themselves with communication technology. We need to get these people working for us in collective problem-solving rather than sitting on the outside and simply complaining or not participating at all. I am really concerned that the people who are most connected or wired in our society, say the 20-something generation, are now voting at a 25% rate or something like that. It is an extraordinary disengagement from the political process, which is supposed to be a process of collective problem-solving – working out what our interests and values are, looking at all the facts and the different tradeoffs we have to make, the opportunity costs, and then coming up with a solution that is the best we can find. And so many people are simply checking out of that formal process and they are engaged in other things like non-governmental organizations and community activism and stuff. But somehow we have to get them engaged in the larger process, because there are some problems that can only be solved at larger scales, say, at the national or federal level, or even at the international level.

PAUL: Let's just separate this into the two kinds of issues. One of the points that you make (is) that nature interacts with itself. Number two, added to that (is) the way that nature interacts with itself and we begin to interfere with it.

THOMAS: Right.

PAUL: It is something that we obviously don't understand and…whether it is predetermined or simply random chaos is something that none of us know. But, the fact is, we simply do not know how all of these various inputs are interacting one with the other. Now, if somebody, in terms of climate change, was able to take a much broader view than that (of) 20 different disciplines each in their individual silos, which is not, it seems to me, an issue (where) the citizen is going to be able to interact much. Whereas the citizen faced with the overall perspective brought by a group of people (that is) put in front of them (with the question) 'what is the public policy result to deal with this?' – that is where the citizen can get involved with it. Is that not true?

THOMAS: Well, I think so. I think you are right that most citizens won't have the technical knowledge or the capacity to look at the whole problem and to come up with something. They don't have the time or the resources. Even the ones that have the cognitive ability and the education to look at the whole thing won't have the time or the resources to engage with the problem and understand it as a whole. So that has to be left to probably a smaller group of

professionals. I think that we can do a better job at identifying those people who are particularly good at that and training them within our educational system. That is just a side point. I think that our citizens can help in a variety of ways and be much more engaged than they are now. I think that there are significant value issues and choices that have to be made here. When we are talking about something like climate change, there are some significant decisions about the way we structure our cities and how materially intensive our lives are going to be – what we understand as 'the good life.' And we don't talk about those things together very much; we make private decisions. Well, maybe we should start talking about those more and try to come to some rough and ready consensus on where we are going as a society. I mean, it has very significant implications, for instance, on the density of our urban areas and what kind of lifestyle we want within those urban areas. There is not good institutional space right at the moment for people to get together to talk about what those values are and to bring them to the surface and then think about what the implications are. But, there is another part too, and this is much more pragmatic. I sort of always think about the old story that it is often the people working on the factory floor who know how to fix the production process best and have great ideas for tweaking things and making things work better. I think that nurses often have a lot to say about why the health care system is not working well. Or teachers have a lot to say about why the educational system is not working out well. We rarely listen to people in those professions, or citizens in general, about why they think that the political system is not working well. There (are) particular problems that they might have something to contribute to or have some good ideas about, yet those ideas rarely make their way into parliament, into the public formal decision-making process. And I would like to see us develop a mechanism whereby people get involved in practical problem-solving because I think that – you put your finger on it earlier in the conversation – as our world becomes more complex, it becomes less and less possible for a relatively small group of people at the centre of society to solve all the problems and manage everything. You have to distribute problem-solving through the system. You have to distribute the generation of ideas as much as possible through the system. I think that there are a tremendous number of very good ideas out there but they are not heard. Some of them might be small, some of them might be large, but they are not heard because our system is not set up for a vehicle to get those ideas into a place where we can consider them properly. I think the other thing is that if people can be

involved in developing a consensus around a solution to a problem then the public in general can be involved in developing a consensus and participate in developing a solution to a problem. Then it is going to have a lot more support. It is going to be much easier to implement that solution because the public will regard it as more legitimate than (an idea put forward) by a bunch of remote people in Ottawa.

PAUL: But, in the end, is that the role of parliament?

THOMAS: Well, I have not worked out all of the details yet, but I think that we need to start thinking about how we are going to integrate parliament with more of an electronic democracy – using information technology to promote democracy and make it work better. We have a highly wired population in Canada. There has been lots of discussion about e-democracy and how that might work. The problem is turning it into more than just a place where people can complain about their particular concerns and how much they hate politicians.

PAUL: Let me just challenge you for a minute. But before I do, I just want to segment our conversation. (Regarding) the point that (you made about) why don't we talk to the nurses or why don't we talk to the teachers when we are looking at the education system – if, in fact, that does not happen, then that is a failure of those whom we ask to look at something. In other words, if we say 'let's set up a commission to look at the educational system,' then the most logical thing is that at some point they are going to talk to the teachers.

THOMAS: Right.

PAUL: If Roy Romanow is going to do a commission on health care, at some point he is going to talk to the frontline health care providers. Now, if that is not happening, then that is a severe condemnation of whatever the commission or the study happens to be. So one should expect that (type of consultation) is going to happen (with a commission). The second thing involved in what you are talking about is our failure to understand the grid system by which power is shared throughout North America, which leads to a black out. Or our failure to understand how something like SARS can appear one day on a farm in China and the next day in New York. So, all of that which I just raised is something at some point that I would very much like to talk to you about, because I think that (we need to go) into far greater depth. But I just want to set that aside (for the moment). Let's bring the conversation back to where we were in terms of

citizenship engagement. And this is where I guess I am going to challenge you – if you do not have the face-to-face interaction of citizens arguing their own perspective...

THOMAS: Right…

PAUL: . . .and you rely on electronic town halls, which seems to me is a whole bunch of people off in their own little silos simply putting in their information. . .

THOMAS: Yup…

PAUL: . . .then I don't think that you are going to accomplish what it is that you are trying to accomplish.

THOMAS: Well, you may be right. I hope you're not, because more and more engagement between people in our society is in electronic form now. And people like Bob Putnam at Harvard have been very concerned about this and they think that this is contributing to a decline in what he calls "social capital" – the kind of trust and networks of reciprocity that develop in society because you meet people face to face and you meet them in local groups, maybe just sports groups or religious groups or town hall meetings, or what have you, and you learn to work with them. I think that there is a lot to that. I think that there is a lot to the idea of face-to-face interaction. The problem is our societies are very big and very complex now and have to deal with problems that affect everybody in some dimension or another, and you can't get everyone into a room to have that kind of face-to-face interaction. Ideally that would be best. But I also think that the devil is in the details in terms of how you set up some kind of electronic democratic process. And what I was suggesting was a front end to the parliamentary committees – a way in which they could engage thoroughly and in an exciting way and actively with the public. I think a lot depends on how you design the process. There are things that you have to do, for instance, to make sure that the process is not hijacked by the most pestiferous and best-wired groups within the Canadian public, so that quieter groups that may also have an interest in the issue will also have a chance to have their say. You have to work out ways by which you don't just get a hundred ideas all scattered across the map, but that you actually get some accumulation over time and some winnowing out of the best ones. Now I think that this is a tractable problem. As in any institution, whether it works effectively or not depends critically on the details. I think that we should be

investing a lot of thought in how we can do this and make it work. Now, I agree with you: if we could have a democratic process that would involve a lot of face-to-face interaction, which would be best. But in the absence of that, and in the presence of all these very large, complex and fast-moving problems, and given the fact that everyone is already wired together and that is the way they are increasingly interacting with each other, I think that we have to make a virtue of the situation and try to make it work on behalf of a democracy. I see this kind of technology, e-democracy technology, as being plugged into and serving the interest of the existing parliamentary system.

PAUL: Let me give you a practical problem and tell me then what your reaction to it is. I am heading up a UN commission on how you get local small business going in the most impoverished countries in the world.

THOMAS: Right.

PAUL: And one of the things that I had thought about was to create some kind of global chat room to basically go out to the world.

THOMAS: Yes.

PAUL: The question really is, am I going to get flooded with a whole bunch of opinions that I am not going to be able to go back to and react to? And is it going to be as fruitful as doing what we have done, which is call together 20 experts from around the world, all of whom have got their own networks. . .

THOMAS: Right….

PAUL: . . . put them into a room and say we are going to take a day and argue this out so that we react immediately, face-to-face, to the other person's idea.

THOMAS: I don't see the two things as mutually exclusive. One of the problems is that the average person just does not have the technical information at his or her disposal to really participate in the debate effectively. So any kind of process, like the one I was talking about, would have to have an interaction with experts and there would have to be an expert component to it. I have travelled around talking to people all over Europe and North America. I have a good deal of expertise in certain fields of political science, but I find that, inevitably, I learn something from listening to people who are on the outside. You can get so close to these things after a while that you don't see some important possibilities, maybe some lacuna that hasn't been explored before. Or maybe you are losing sight of some overarching values that need to be better

articulated. And I think that from the point of view of not just solving the problem, but actually creating a workable democracy, we are seeing this divergence between an expert elite and the average person within society, and that is very dangerous over the long term. It undermines the legitimacy of the process. People feel they don't have a role, they can't participate, they have no say. So what I am trying to think through is how can we make sure that they feel that they do have a role and that they have something to say and that it is actually sometimes listened to. And that was a feature of some of the more ideal forms of democracy, say the town hall types of democracy in earlier days, and it is something that has really been lost now. If we move to a kind of elite expert system, we may come up with generally the best solutions but we will lose the support of the public over time and that is essential to a well-functioning democracy. I am really concerned about the drop in voter participation in elections. That is a canary in a coalmine as far as I can see.

PAUL: I don't disagree with you, but fundamentally if you don't make parliament work, if parliament is not functioning, and if parliament is not regarded as the ultimate forum in the country where views are exchanged and debates are taking place and decisions are finally made, then how can anything else that we do….

THOMAS: I don't see anything that I am suggesting as replacing or an alternative to parliament.

PAUL: So what you are suggesting is this is how we are going to make parliament work better?

THOMAS: Well, I see this in terms of a funnel. The big open end of the funnel would be facing to the Canadian public and their ideas could be funneled – and again a lot depends on the architecture of that funnel on how the winnowing process works, how the accumulation and improvement of those ideas works as they work their way along that funnel – but they would be funneled towards the committee system, and then the committee system and parliament itself would have to go through the tough political choices and the budgetary issues, their financial issues, political trade-off, their issues of provincial verses federal jurisdiction – there are a host of factors that have to be considered independent of those that would probably be considered by the general public. But I would like to get those nurses and teachers involved in the process and I think that we might be surprised by how innovative sometimes they are and how aware they

are of the larger political constraints and the strategic constraints that parliament faces too.

PAUL: I don't disagree with you, but the question is, who should get those nurses and teachers involved?

THOMAS: Well, we are going to run a couple of small experiments at the University of Toronto over the next year or so to try to resolve some of these architectural issues for a process of social decision-making on the internet. But, if you were to work out the mechanisms so that they were effective, I could see that hundreds of thousands of people could participate in this process around any one particular problem.

PAUL: Who is going to get those hundreds of thousands of people involved?

THOMAS: I think if you provide them with the forum and it's credible and not just tokenism, I think they'll come on their own accord.

PAUL: But nonetheless, somebody has to do this.

THOMAS: Well, I mean, it has to be the federal government.

PAUL: And is it going to be an individual member of parliament? Is it going to be a minister, is it going to be a department of government? Who is it going to be?

THOMAS: Well, my guess is that would be ultimately in your bailiwick – how it's split between departments, how it's going to work. I can't say at this point. But it seems to me that fundamentally it's a federal responsibility if we are talking about a collective action problem here. We have a lot of people in the country who have ideas and are keen to participate in one way or another but they are having trouble organizing themselves to do that. Government is principally about solving collective actions problems. And essentially, the federal government is about solving macro-collective action problems that are about the whole country. And so it falls to the federal government, it falls to cabinet, on how those federal responsibilities are divided across different departments. I wouldn't know which department would be best capable of handling something like this. But I'd want to stress that if it were to be done, it has to be done right and a lot of the experimentation would have to be done in advance. And I want to stress this idea of experimentation. I mean Mel Cappe used to say that we need to be comfortable with experimentation and "creative failure," as he calls it. And I really agree with that. I think the process of trying

to develop this architecture of e-democracy is one where we have to do a lot of experiments. That's something that could perhaps be supported by the federal government – the research process of doing that. And then once the system is set up, it has to encourage within it – if we are dealing with a problem like health care or climate change or what have you – a willingness to take risks, creative experiments and the possibility of "creative failure." One of the things I see happening within public services across Canada is that they've become incredibly risk-adverse. And I think that this idea I'm suggesting could also help educate Canadians to the fact that if we're really going to be nimble in response to a lot of these complex problems we face, we have to be experimenting all the time. We have to learn from our failures.

PAUL: Again, I agree with a great deal of what you are saying. That governments have become incredibly risk-adverse I think is absolutely correct. Part of the reason is the insecurity that arises out of not having to talk to people enough so that governments don't feel that they have built the kind of consensus that will allow them to take the chances that they should have taken.

THOMAS: Right

PAUL: But again, with respect, I think you're avoiding the question of how do we do this. Let me just give you an example. If you want to get to those who are on the front lines and the most knowledgeable . . .

THOMAS: Right…

PAUL: . . . then, when in the preparation of policy, it's up to the executive branch of government – the bureaucracy, for instance, within government – to get out and to speak to these people as much as it is (up) to the elected members of parliament…

THOMAS: Right…

PAUL: Now, at the same time, (there are) people who should be ensuring that this takes place – (that's) the elected member of parliament – so that when the bureaucracy comes up with their ideas, and the interaction occurs between parliament and the executive branch of government, they can say either (they've) been talking to the frontline health care workers or (MPs have).

THOMAS: Yup…

PAUL: How do you ensure that this happens? And who has the responsibility to ensure that it happens and how do you make sure that that responsibility is discharged?

THOMAS: A lot of the difficult problems we have now cut across several departments. So we are not going to be able to say Health Canada is solely responsible for creating this dialogue with Canadians. It may have to be interdepartmental. They might be a lead department, but there is going to have to be some interdepartmental arrangement, probably in a lot of cases. I don't want to see MPs sidelined. I think they do play a very important role. But they are suffering from the very same kind of information overload that we started this conversation with. And so, I think they are less and less able to actually be conduits for ideas and to articulate the pulse of the population on a particular issue because, you know, they've only got 24 hours in a day and there are a millions things going on around them, and they've got hundreds of constituents jabbering away all vying to get their attention. So, I would say that it's probably going to be largely up to the bureaucracy. And to set up a process, it would have to be advertised across the country (saying) we are looking for your ideas and opinions. And I think a very important thing here is the tone. What I'm suggesting is that Canadians are engaged actively and pragmatically in problem-solving. They are actually participating in the problem-solving. They are not the final step in the process, because that happens in parliament. But they're not just being consulted in a sort of passive way, and they just voice their opinions and then people go off and try to make sense of all those opinions and find optimal solutions. Instead, they are more intimately involved in trying to figure out what the best solution is. Because all of these problems we are talking about, there is no magic bullet for any of them. They are complex problems, they require complex solutions. Components of those solutions will be micro-components, things that are done, as I said before, on the shop floor – changes in the classroom, changes within the hospital ward. You do a lot of those things and they can accumulate and add up to have very significant macro effects. But we need lots of ideas coming in through that funnel. And I'd like to see Canadians engaged as problem-solvers, because that's where they want to be. I think that would make them, in a sense, proud to be participants in the democratic process. Not just as people who are expressing their opinions and values and then aren't talked to again, but are actually engaged in the process. And I think how this is done depends fundamentally on a change in mindset within the federal bureaucracy. There has to be a

willingness to really listen and to provide space for Canadians to participate. And there is going to have to be advertising. And there is going to have to be a change of the culture within many of the bureaucracies and the departments in order to encourage them to listen to Canadians.

PAUL: I agree with your basic thesis very, very much. I'm not sure I agree with your choice of the mechanism. And I happen to think that the choice of the mechanism is going to be crucial if you are going to succeed. Let me just explain. Both the bureaucracy and individual MPs are both going to seek out elite opinion…

THOMAS: Um-hum...

PAUL: …and they are both going to seek out conversation with Canadians. The issue is: who is going to do which better? And it would be my judgment call that if you look at the nature of the role of a member of parliament, that member of parliament is more likely than the bureaucrat … to seek out the views of Canadians. There is a tendency for the bureaucrat to seek out … elite opinion.

THOMAS: Right, I agree. Right.

PAUL: So if that's the case, it seems to me that you might want to make the argument that what we really should be doing is giving members of parliament far greater tools so that they can, in fact, do exactly what you want them to do.

THOMAS: Well, this comes back to the parliamentary committees then, I suppose, and maybe this should be a responsibility of the committees. They should be funded to create this dialogue, a problem-solving space with Canadians rather than individual departments.

PAUL: Or, maybe it should be given to individual MPs, and maybe it should be made part of the understanding that MPs should be using these tools and this is the way to go at it.

THOMAS: Right.

PAUL: That we probably should create a new ethic in terms of how MPs are going to communicate with Canadians.

THOMAS: I want to just come back to the second issue that you put on the side for a moment because I think it's also relevant here. You've been mentioning that a lot of the challenges that we face have what I call "unknown-

unknowns" – basically, there are unexpected developments. These systems have become so complex they are opaque to us.

PAUL: Before you do that, could I just ask you one other question?

THOMAS: Sure.

PAUL: Okay, I really do want to come back to that. I just want to ask you one other question. When you go out using all of the means of e-technology to ask (people) their views, you're not worried that if you go out to vast numbers that all you are really going to be getting is a sophisticated polling?

THOMAS: Right…

PAUL: . . . as opposed to going out to a much smaller group where you could engage in dialogue?

THOMAS: Well, this might not work, but I think it is worth a try. And again, I think a lot depends on the architecture of the system. But I just want to note something that you said just now. You said we go out and use this e-technology to ask their views. I think what we really should be doing is asking them for help, co-opting them into the process. It is not just that we want their views – we want assistance. That makes them participants in the problem-solving process. Now, how we do that and not have just chaos, electronic chaos, or electronic cacophony is – I mean I'm not going to downplay how difficult that is going to be. It is going to be tricky but I think that … it can be done. And I think some of the evidence that it can be done is that there are now very complex problems being solved on the internet – technical problems – through this open-source problem-solving approach that we are seeing, for instance, with the development of the Linux software and the Apache web server. And these are situations where everybody participates. Now, they're very technical problems, and there is a certain level or threshold of expertise you have to have before you can even begin to get involved. But I've seen analyses of the structure of these problem-solving approaches and I don't think there is any reason in principle why you couldn't take that kind of problem-solving approach and apply it to other kinds of problems. In fact, people are starting to think in those kinds of terms now. How can you create open-source problem-solving? Not just for creating software, but for solving a whole range of problems. And there are certain things about the way the system is set up that keeps it from becoming chaos. You have to have decision makers along the way. You have to have some groups or people who say, 'Okay, at this point we

are going to take these 10 ideas and we are going to leave the other 90 behind. And we are going to work on these 10'. How you make that kind of winnowing process legitimate so that everybody thinks it's fair is tricky, but I don't think it's impossible. And my guess is that these are basically tractable problems. But we need to do research here and I think it is a fairly pressing matter. I would like to see some serious thought given to this. There are people sort of poking at the issue in various places. I've been collecting information and talking to people about it in various places in Europe and the United States, but most of them have been looking at creating fora or chat rooms that I think would be vulnerable to exactly the kind of thing that you're concerned about, which is, you know, you just get a million points of view and everybody get frustrated because nobody is really being listened to.

PAUL: Okay, I interrupted you because we are coming close to the end, although I would like to do this again. But let me just go back when I interrupted you and you wanted to go onto the other topic.

THOMAS: Well, the thing that we are finding now is – I use an analogy of a car engine. I used to work on cars a lot when I was a kid and, you know, back in the '60s car engines were pretty simple: you could see all the parts and work on them pretty effectively. Now you open up the hood of any modern car and it is completely incomprehensible, with all the wires and tubes and modules, and you can't even find the basic things, like timing chains and distributor caps and things like that. Everything is so complex that even some of the people that work on these cars don't understand them and their details now. And they fail in unexpected ways. These complex systems fail in ways that we have not anticipated. You see this in software all the time, you see it in electrical systems, where you can't anticipate all the possible interactions between the parts. And so you get unexpected failures that can really be devastating sometimes. I think that the kind of decision-making process that I am suggesting could help us move towards a faster response to that kind of "unknown-unknown." When something happens that is a surprise, you need lots of heads involved rather than just a few people at the centre. What you find with systems that are very nimble, economic systems, ecologies that are very nimble in responding to complex problems, is that problem-solving is distributed within the system. There are lots of different actors engaged in trying to crack the problem. And so, I think that we need to move in this direction if we are going to have adaptive societies. We need to move away

from hierarchal and centralized decision-making, towards distributed non-hierarchical decision-making, if we are going to deal with the kinds of problems that we have in the world today.

PAUL: There is no doubt in the necessity of moving away from hierarchical problem-solving. You have to get much more horizontal. I have always believed this. But ultimately, someone has to make the final decision.

THOMAS: That is right. You find that in the open-source architectures that I was talking about, there is always a final decision-maker, but you have lots more input into the process. And there is a constant kind of churning of ideas and there is a lot of micro-experimentation going on. You know markets are excellent examples of what are called complex adaptive systems. There is all this creative destruction going on and they are unbelievably adaptive in response to change. The problem with markets is they are optimized to produce wealth and maximizing profits, and within societies we want to optimize other things. But the general analogy of a marketplace of ideas, of the experimentation going on, of the low risk-adversity within a market, I think all of those are important ideas that we need to try to build into this new system, this new social decision-making system that we would be creating.

PAUL: I agree with you about the incredible superiority of the market in allocating resources. But, it is not only limited to the market. You know, this concept of the social economy – if you build the right incentives then you can use the market system within a community, whether it is how do you take care of physically disabled children or how do you deal with unemployment. Within a small community, you can, I think, provide market incentives to accomplish social goals.

THOMAS: Yeah, and that's close to the kind of thing I'm thinking of. What you find within open-source problem-solving architecture is a kind of market incentive. There's no payments to the people who contribute good ideas, but there are incredible psychological kudos that come with it – the sense of having contributed a solution to a problem that was holding a lot of other people up, and making the common good better. And when you read the analysis of something like the Linux software development process, you find that those psychological incentives are really important and they work. They really work. I think … all kinds of people would be keen to participate in a kind of ideas economy, or an ideas market, where there would be a fairly explicit Darwinistic evolutionary process, where the best ideas move on and the worst ones are

weeded out. But I think that people would still find that it's a very rewarding thing to participate in.

PAUL: I agree with you. I really do. That's where I go back to this idea where you have market incentives to this social economy. It is not a market incentive to make money; it's a market incentive to basically say 'I'm going to weed out the bad ideas to pursue the good ideas.' I think that is dead on.

THOMAS: I've talked to a few departments in Ottawa about this with mixed success, and in Toronto where I've said 'Think through about how you might create this kind of environment within your department.' And sometimes I get blank expressions, sometimes I get very interesting ideas coming back. I think a lot depends on departmental culture. Many of the departments are exemplary of hierarchical decision-making.

PAUL: But if you want to turn that declining voter participation ratio around…

THOMAS: Yeah…

PAUL: . . .I think before you focus on government departments you have to focus on parliament.

THOMAS: Yup, I would agree with that, now that we've talked about it.

PAUL: I have really enjoyed this and I think that … we've barely scratched the surface. I'd like to do this again.

THOMAS: Sure, anytime. It's delightful and, to be frank, I'm really thrilled that you would have this kind of expansive interest in the workings of our democracy. I think there are some real problems that have to be addressed at this point. We have a world that has changed dramatically in the last 50 years, especially in the last couple of decades, in terms of the power of our citizens, and we are still basically with institutions that evolved in the 18th and 19th centuries. It is time we updated them.

PAUL: Well, that's my view and that's why … I think what we've really got to talk about, and we should get a lot more people talking about, is just how do we do that. So let's just do this again.

Epilogue

What exactly does public engagement look like to any candidate for the Presidency of the USA? Perhaps more importantly, what does the possibility of public engagement mean to US, the people who are aware of what is possible? What does it look like to their supporters? To ordinary Americans? To current power holders?

Here are four possibilities. Public engagement could look like:

1. A MANDATE FOR THEM: The winner's supporters become a movement that supports their agenda in Washington, as represented by their existing platform devised by anonymous elites, with or without our inputs.

2. OPEN GOVERNMENT: They will open up the decision-making process so citizens can see more clearly what's going on, offer input on proposals and legislation, and more effectively do activist advocacy work while providing many-eyed scrutiny of legislative and regulative proposals.

3. DELIBERATIVE DEMOCRACY: They will help We the People come together to develop our own wise solutions and policies—and they will be the person On Top that supports our bottom-up process and agenda.

4. SYSTEMS CHANGE FOR WISER DEMOCRACY: They will mobilize the country to *institutionalize* our capacity to govern ourselves more wisely and directly. They would have citizen deliberative councils evaluate such initiatives as Earth Intelligence Network's Electoral Reform Act, Denmark's Consensus Conferences, Porto Alegre's Participatory Budget and Mike Gravel's Initiative for Democracy for possible establishment in the U.S.

(1)–(4) are all *transformational approaches*. I've listed them in order of increasing transformational potency.

Note that citizen deliberative councils and other citizen deliberation methods are ***made up of citizens who use stakeholders and experts as sources of information***. There is a difference between having diverse stakeholders or diverse ordinary citizens in the deliberative, decision-making role. The stakeholder approach of "resolving the conflicts among interested parties" is very different from citizen-centered approach of "helping diverse citizens figure out the best policies, budgets, candidates, etc., for their community or country." Ideally, ways would be found to integrate both approaches, such as having a conflicted stakeholder dialogue develop a consensus solution that is then turned over to a citizen deliberative council for consideration as one of several possible solutions. And then if the citizen council is leaning toward a different solution, they can talk with the stakeholders (who are "on tap", not "on top"), before making their final decision. There is no sign yet that any candidate has this kind of sophistication in thinking about public engagement. We can create the conditions where candidates start doing that.

We the People can't afford to put all our eggs in the basket of temporary leaders, no matter how inspiring they are. We need to have the continuity of established institutions that actually work to bring greater vitality and wisdom to democracy. ***We need a sustainable collective capacity to make wiser choices that make sense to the vast majority of us—***and the capacity to change those choices when they no longer make sense.

That would be a profound legacy for any president—or governor, or mayor—to leave behind. And once We the People become accustomed to that, it will be hard for someone to take it away or degrade it.

We need that capacity—and we need it soon—to wisely meet the immense challenges we face. Individual candidates are too limited and vulnerable to provide the kind of dependable guidance we need over the long haul. But they can provide the impetus—in a possibility-filled moment in history like this one—to shift our whole system in wiser, more sustainable directions.

Whether the winner will do the latter depends totally and utterly on us.

Co-heartedly,

Tom Atlee

Strategic Reading Categories for Browsing Amazon Reviews

America (Anti-America)
America (Founders, Current Situation)
Association Management & Foundations
Asymmetric, Cyber, Hacking, Odd War
Atlases & State of the World
Atrocities & Genocide
Banking & Federal Reserve
Best Practices in Management
Biography & Memoirs
Budget Process & Politics
Capitalism (Good & Bad)
Change & Innovation
Civil Affairs
Communications
Complexity & Catastrophe
Congress (Failure, Reform)
Consciousness & Social IQ
Corruption
Cosmos & Destiny
Country/Regional
Crime (Corporate)
Crime (Organized, Transnational)
Culture (Including Family, Society)
Decision-Making & Decision-Support
Democracy
Diplomacy
Disaster Relief
Disease & Health
Economics
Education (General)
Education (Universities)
Empire, Sorrows, Hubris, Blowback
Environment (Problems)
Environment (Solutions)
Executive (Partisan Failure, Reform)
Force Structure (Military)
Foreign Language Books
Future
Geography & Mapping
History
History of Civilization & Great Books
Humanitarian Assistance
Impeachment & Treason
Information Operations
Information Society
Information Technology
Insurgency & Revolution
Int'l J. Intel & Counter-Intel (IJIC)
Intelligence (Collective & Quantum)
Intelligence (Commercial)
Intelligence (Extra-Terrestrial)
Intelligence (Government)
Intelligence (Public)
Intelligence (Reform Studies)
Intelligence (Wealth of Networks)
Iraq
Justice (Failure, Reform)
Leadership
Media
Military & Pentagon Power
Misinformation & Propaganda
Nature, Diet, Memetics, Design
Naval War College Binders
NDU (Publications)
NDU (Reserve Course Blue Books)
Peace
Poverty, & Middle Class Decline
Philosophy
Photography Books (Countries)
Politics
Power (Pathologies & Utilization)
Priorities
Privacy
Public Administration
Religion & Politics of Religion
Science & Politics of Science
Secrecy & Politics of Secrecy
Security (Including Immigration)
Stabilization & Reconstruction
Strategy
Survival & Sustainment
Technology (Bio-Mimicry, Clean)
Terrorism (less Jihad)
Threats (Emerging & Perennial)
True Cost & Toxicity
United Nations & NGOs
Values, Ethics, Sustainable Evolution
War & Face of Battle
Water, Energy, Oil, Scarcity

See also Table of 1100+ Reviews at www.earth-intelligence.net organized by ten high-level threats and twelve policy domains.

Synopsis of the New Progressives[1]

Short-hand descriptions of core strategies for national growth:

- Anti-materialism
- Pro-civil liberties
- Ecological sustainability
- Person-centered
- Futurist, planetary perspective

Specific strategies for wholesome growth as a Nation

- Restore utility of politics—return to issue-based politics
- Restore inclusive democracy, control corporations, one vote per person
- Restore morality to capitalism, both at home and abroad
- Restore primacy of the individual through personal growth
- Restore value of citizenship, civic duty, commitment to the National well-being
- Restore civility to discourse—elevate feminine over masculine decision styles
- Restore ecological sustainability, at home and abroad
- Restore "seventh generation thinking", focus on future for our children
- Restore the one-income two-parent family as the foundation of a stable Nation
- Restore community at every level from neighborhood to relations among nations
- Emphasize universal high quality education as foundation for national security
- Emphasize universal public health care as foundation for national prosperity
- Emphasize telling the truth and stock-taking over deception and manipulation
- Emphasize civil liberties and local protection over federal police state approaches
- Emphasize accountability at home and abroad, over war crimes and sovereign immunity
- Neutralize extremism of all types, whether religious, corporate, or gang-related

Operational Strategies for Winning the Primaries and then the General Election

- Classify the other Democratic candidates as Bush Lites, sell-outs to Big Money
- Create a Big Tent strategy—coalition cabinet, commitment to end gerrymandering
- Unite Blue (workers), Green (environment), Apollo (Energy), and Human Rights (fems/gays)
- Unite people of color, new immigrants, NASCAR dads, and single moms as a new collective
- Re-energize Main Street, neutralize Wall Street—ethics is pro-business and pro-consumer
- Restore collective bargaining and the role of all associations as political actors
- Redefine liberals from left to in front
- Energize non-voters by providing them with paths to power at all levels
- Claim and define the morality of politics, business, and religion in clear terms
- Define Republican Right as extremist, amoral, regressive, elitist and out of touch with reality
- Define "smart politics" and "smart defense" by showing the economic value of education, health care, energy conservation, and environmental sustainability
- Harness the distributed intelligence of the Nation—use the Net to get votes, money, and *ideas*

[1] Based on Paul Ray's pioneering work and in particular, his emerging work, "The New Political Compass." In the online version, links to Wikipedia Page, and *Cultural Creatives* at Amazon.

Fifty-Two Questions That Matter

1. Will you support and demand Electoral Reform Legislation to pass by January 2008? If so, what eight elements of reform would you include?
2. Can you explain why voting needs to take place on a holiday or week-end?
3. Can you explain why today's presidential debates are rigged, not honest, and must be changed?
4. How might we improve our ability to understand who you would appoint to your Cabinet, and what policy perspectives they would apply on our behalf?
5. Even if we did nothing else, what one change could be legislatively mandated in time for 2008 that would assure a genuine winner satisfactory to the majority of us?
6. Most Americans today no longer identify with the leadership of either of the two traditional parties. How can we migrate toward full and balanced representation of all political points of view in our legislatures?
7. Apart from full and balanced representation in the House of Representatives, how can we improve localized representation from District to District?
8. How to we eliminate corruption in the legislature and the executive at all levels, and free our representatives to spend 100% of their time on the People's Business?
9. How do we impose on every legislator at every level the lesson that Davy Crockett learned, that the public funds are not theirs to give?
10: The White House and Congress have run the economy into the ground, imposing an enormous debt burden on us all. How do we fix that?
11. Can you name, in priority order, the top ten high-level threats to Humanity and our Republic as identified by LtGen Dr. Brent Scowcroft and the other members of the High-Level Threat Panel?
12. Senators and Representatives used to brag that they did not need a passport because nothing that happened overseas mattered to their constituents. Do you have a one line answer for why that's wrong?
13. Why is poverty more of a threat to the Republic than any other threat including war?
14. Why is Infectious Disease the second greatest threat to Humanity and the Republic?
15. Name the five largest exporters of weapons used in inter-state conflict and civil war.
16. Describe the root causes of Civil War.
17. Name four countries with on-going civil wars.
18. Name as many on-going genocides as you can.

19. Name at least two types of Other Atrocities.
20. What Nations are active in the proliferation of nuclear, chemical, and biological weapons?
21. What's wrong with the Global War on Terror or GWOT?
22. How big a problem is Transnational Crime?
23. Can you list, in alphabetical order, the twelve policies that must be harmonized?
24. Can you name the eight demographic wild cards that will determine the future no matter what the USA and Europe do?

For 25-44, name three elements or reasons for each:

25. Agricultural Policy
26. Diplomatic Policy
27. Economic Policy
28. Educational Policy
29. Energy Policy
30. Family Policy
31. Health Policy
32. Immigration Policy
33. Justice Policy
34. Security Policy
35. Society Policy
36. Water Policy
37. Brazil Demographic
38. China Demographic
39. India Demographic.
40. Indonesia Demographic.
41. Iran (Shi'ite) Demographic.
42. Russia Demographc.
43. Venezuela Demographic.
44. Wild Cards Demographic.
45. In 2007, how much did our government spend on diplomacy as opposed to war? Comment?
46. In 2007, how much did our government spend on spies and secret satellites, as opposed to legal ethical sources of foreign intelligence? Comment?
47. Will you commit to naming your Secretaries of State and Defense, and your Attorney General, prior to 3 January 2008? Prior to 1-October 2008?
48. If you win the nomination for the general election, will you commit to Cabinet-level debates?
49. If you win the nomination of your party, will you commit to preparing and posting online a balanced budget prior to Election Day?
50. Can you explain transpartisanship, and commit to appointing such a Cabinet?
51. What is America's greatest source of strength?
52. What can we do to get America back on track?

Transpartisan "starter" answers at www.earth-intelligence.net.

Glossary[1]

3D	Three Dimensional
3R's	Responsibilities, Rights, Respect
ADDNI	Assistant Deputy Director of National Intelligence
AGSI	Association for Global Strategic Information
AI	Artificial Intelligence
AIDS `	Acquired immune deficiency syndrome
AJAX	Asynchronous Javascript and XML
AOL	America Online
API	Application Program Interface
ARINA	Acting Researching Integrating Network Associates
ARPA	Advanced Research Program Agency
ART	Ask Questions, Reflecting, Tell Stories that matter
ART	Ask (Question), Reflect, Tell (Stories)
ASD	Assistant Secretary of Defense
ASG	Assistant Secretary General (United Nations)
AVSS	Automated Vehicle Screening System
BALLE	Business Alliances for Local Living Economies
BBG	Broadcasting Board of Governors
BMS	Bristol-Myers-Squib
C+N	Civic Intelligence Awareness Level + Number
C2	Command & Control
C3I	Command, Control, Communications, & Intelligence
CAD	Computer Aided Design
CAE	Computer-Aided Engineering
CALS	Computer-Aided Logistics Support
Calit2	California Institute of Telecommunications and Information Technology
CASE	Computer-Aided Software Engineering
CCC	Coalition Coordination Center
CD	Compact Disc
CDC	Citizen Deliberative Council
CE	Concurrent Engineering

[1] We commend Acronym Finder, at http://www.acronymfinder.com.

CEO	Chief Executive Officer
CI	Collective Intelligence (also Competitive Intelligence)
CIA	Central Intelligence Agency
CICA-STR	Coloquios Internationales Sobre Conflicto Y Agresion-Society for Terrorism Research
CIM	Common Information Model
CIML	Collective Intelligence Mark-Up Language
CIO	Chief Information Officer
CLI	Command-Language Interpreter
CMC	Computer-Mediated Communications
CNI	Coalition for Networked Information
CO2	Carbon Dioxide
CODIAK	Concurrent Development, Integration, and Application of Knowledge
CPR	Cardiopulmonary Resuscitation
CRC	Canada Research Chair
CRM	Customer Relationship Management
CRS	Congressional Research Service Report
CSIS	Canadian Security Intelligence Service
CSCW	Computer-Supported Cooperative Work
CUPUM	Computers for Urban Planning and Urban Management
DARPA	Defense Advanced Research Program Agency
DHL	Dalsey, Hillblom and Lynn (Founders, DHL Worldwide Express)
DIA	Defense Intelligence Agency
DOD	Department of Defense
DOI	Date of Information
DNI	Director of National Intelligence
DOS	Department of State
DSSS	Direct Sequence Spread Spectrum (wireless networking)
DTIC	Defense Technical Information Center
DVD	Digital Versatile Disc or Digital Video Disc
E3i	Ethics, Ecology, Evolution, and Intelligence
EEI	Essential Elements of Information
EI	Enterprise Integration
EIN	Earth Intelligence Network

EM	Electro-Magnetic (Pulse)
EMISARI	Emergency Management Information System and Reference Index
ESP	Enterprise Search Platform
EW	Electronic Warfare
FAQ	Frequently Asked Questions
FCC	Federal Communications Commission
FRSC	Fellow of the Royal Society of Canada
FTP	File Transfer Protocol
GAO	Government Accountability Office
GDP	Gross Domestic Product
GHG	Green House Gas
GISMO	Geographic Information Systems & Mapping Operations
GK	Global Knowledge
GK97	Global Knowledge 1997 (Conference)
GNU	Gnu's Not Unix
GPL	GNU Public License
GPS	Global Positioning System
GVTC	Global Virtual Teacher Corps
GVTN	Global Virtual Translations Network
HIV	Human Immunodeficiency Virus
HPSCI	House Permanent Select Committee on Intelligence (US)
HTTP	HyperText Transfer Protocol
IDNDR	International Decade for Natural Disaster Reduction (UN)
IEM	Iowa Electronic Markets
IEML	Information Economy Meta Language
IETF	Internet Engineering Task Force
IIS	Institute for Intelligence Studies (Mercyhurst College)
INSEAD	Institut Européen d'Administration des Affaires (European Institute for Business Administration)
IP	Internet Protocol
IPCC	Intergovernmental Panel on Climate Change
IQ	Intelligence Quotient
IR	Irregular Warfare (Special Operations)
IRL	In Real Life
ISI	Institute of Scientific Information

JTF	Joint Task Force
IT	Information Technology
LED	Light-Emitting Diode
LLB	Latin Bachelor of Law
LLC	Limited Liability Corporation
LLP	Limited Liability Partnership
LOHAS	Lifestyles of Health and Sustainability
M4IS	Multinational Multiagency Multidisciplinary Multidomain Information Sharing
MBA	Master of Business Administration
MDSC	Multinational Decision Support Center
MIT	Massachusetts Institute of Technology
MIT	Massachusetts Institute of Technology
MSF	Medicins Sans Frontiers (Doctors Without Borders)
MTA	Mass Transit Authority
NASA	National Aeronautical and Space Administration
NATO	North Atlantic Treaty Organization
NCI	National Capital Institute
NFIB	National Foreign Intelligence Program
NGO	Non-Governmental Organization
NII	National Information Infrastructure
NL	Netherlands
NSA	National Security Agency
NSF	National Science Foundation
NTIS	National Technical Information Service
NYC	New York City
NYU	New York University
OFDM	Orthogonal Frequency Division Multiplexing
OHS	Open Hypetextrdocument System
OS	Open Source
OSA	Open Source Agency
OSD	Office of the Secretary of Defense
OSI	Open Source Initiative
OSINT	Open Source Intelligence
OSIP	Open Source Intelligence Program
OSS	Open Source Solutions

OSS.Net	OSS Network
OTA	Office of Technology Assessment
OWL	Web Ontology Language (W3C)
P2P	Peer-to-Peer
PC	Personal Computer
POS	Point of Sale
PDF	Portable Document Format
PfP	Partnership for Peace
PPP	Purchasing Power Parity
QN	Quadrant N
R&D	Research & Development
RCMP	Royal Canadian Mounted Police
RDF	Resource Description Framework (W3C)
RFID	Radio Frequency Identification
RN	Royal Navy
ROI	Return on Investment
ROM	Read Only Memory
RSS	Really Simple Syndication
Rt. Hon.	Right Honourable
SSCI	Senate Select Committee on Intelligence (US)
SCIP	Society of Competitive Intelligence Professionals
SDSC	San Diego Supercomputing Center
SES	Senior Executive Service
SF	Science Fiction
SHAPE	Supreme Headquarters Allied Powers Europe
SML	Social Movement Library
SMS	Short Message Service
SOFI	State of the Future Index
SOLIC	Special Operations Low Intensity Conflict
SRI	Stanford Research Institute
SSH	Secure Shell
STAR	Symbolic Tool for Augmented Reasoning
TIEP	Transatlantic Information Exchange Project
TIP	Integral Process for Working on Complex Issues
TM	Trademark Registered (superscript)
TQM	Total Quality Management

TV	Television
UK	United Kingdom
UN	United Nations
UN	United Nations
UNESCO	UN Educational, Scientific and Cultural Organization
UNIX	Uniplexed Information and Computing System
URL	Universal Resource Locator
US	United States
USIP	US Institute of Peace
UWB	Ultra-Wideband (Time Domain Corporation)
VP	Vice President
VPL	Visual Programming Language
VR	Virtual reality
VUB	Free University Brussels
WAIS	Wide Area Information Service
WELL	Whole Earth 'Lectronic Link
WHO	World Health Organization
Wi-Fi	Wireless Fidelity (IEEE 802.11b wireless networking)
WISER	World Index of Social and Environmental Responsibility
WMD	Weapons of Mass Destruction
WWW	World Wide Web
XDDoc	External Document Control
XML	eXtended Mark-Up Language
YMMV	Your Mileage May Vary
YOYOW	You Own Your Own Words

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