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Collaborative Innovation and Collective Intelligence

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Analytic and Policy Articles

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Organization of the Journal

Each issue of *Innovations* consists of five sections:

1. Invited essay. An authoritative figure addresses an issue relating to innovation, emphasizing interactions between technology and governance in a global context.

2. Cases authored by innovators. Case narratives of innovations are authored either by, or in collaboration with, the innovators themselves. Each includes discussion of motivations, challenges, strategies, outcomes, and unintended consequences. Following each case narrative, we present commentary by an academic discussant. The discussant highlights the aspects of the innovation that are analytically most interesting, have the most significant implications for policy, and/or best illustrate reciprocal relationships between technology and governance.

3. Analysis. Accessible, policy-relevant research articles emphasize links between practice and policy—alternately, micro and macro scales of analysis. The development of meaningful indicators of the impact of innovations is an area of editorial emphasis.

4. Perspectives on policy. Analyses of innovations by large scale public actors—national governments and transnational organizations—address both success and failure of policy, informed by both empirical evidence and the experience of policy innovators. The development of improved modes of governance to facilitate and support innovations is an area of editorial focus.

5. Letters. Readers comment on essays and papers published in previous issues of the journal.

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Diego Rodriguez and Doug Solomon

Leadership and Innovation in a Networked World

In 2001, Scott Johnson was a successful Silicon Valley entrepreneur. He had everything he wanted in life, except for one thing: afflicted with Multiple Sclerosis (MS) for 25 years, he lacked a clear path back to full health. That year, he read a brief article in *BusinessWeek* about the possibility of myelin repair. Myelin is the protective coating surrounding nerve fibers in the brain and spinal cord. It is the destruction of myelin in MS that causes the symptoms of the disease, and even death. Understanding how to repair the myelin damaged by MS could mean stopping the disease in its tracks. So began an investigation that led Johnson in 2003 to found the Myelin Repair Foundation (MRF), a non-profit medical research foundation dedicated to accelerating basic medical research into myelin repair therapies that could dramatically improve the lives of people suffering from MS. Of the many medical research foundations doing good work out in the world, MRF is unique because of its collaborative, plan-driven, managed approach to realizing innovation breakthroughs. Realizing that a broad network of researchers could do more than individual investigators working in relative isolation, Johnson pulled together five leading scientists and their labs asking them to work together in the name of collaborative discovery. Any patents resulting from collaboration within this merged network of researchers would be allocated to the

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foundation, and royalties shared among all participating institutions. The result is a new hybrid model for medical research that borrows from both the worlds of business and science.

This networked approach to leading innovation seems to be working. MRF says this approach is cutting in half the time it takes to discover a viable therapeutic drug. In 2006 Johnson was recognized among 50 individuals worldwide by *Scientific American* for innovation and policy leadership. At that point he said, "Before we started this, if you asked experts how long it would be until myelin repair drug targets might be licensed, they replied 15 to 20 years. With this process we expect to license the first target by 2009." In 2007, after only three years of research, the MRF scientific team had identified 13 novel therapeutic targets, and more than a dozen new research tools, assays and animal models. MRF has filed nine patents on those discoveries to date. When compared with leading research universities, this result is more than three times greater per million dollars in research expenditures. By embracing the networked nature of our modern world, the model MRF is developing and demonstrating has the potential to speed all medical research, bringing treatments to those who suffer from other chronic or debilitating diseases for which there are no effective treatments or cures. Networked innovation looks promising. How might it better fit into our future ways of creating value in the world?

REVISITING EXISTING PARADIGMS OF INNOVATION

The idea that innovation works via networks of people and things is nothing new. Innovation has always been about spreading new ideas through populations and systems.[1] But until very recently, the way we've approached the human aspects of innovating, as well as how the technological elements serve to support it, has been very limiting.

As a society, when it comes to people we still celebrate the myth of the lone inventor. Particularly in the U.S. —perhaps as a result of our cultural fantasies about heroes of the Wild West—we idealize individuals. These range from sports figures like Dale Earnhardt, Barry Bonds and Tiger Woods, to business and technological innovators such as Steve Jobs, Sergei Brin and Larry Page, even Bill Gates. Accordingly, much of the thinking about innovation has focused on individuals. Up through the 1960's, the innovation in thinking about innovation was largely about engaging individual creativity. This was seen in the plethora of books on creative people (such as Einstein and DaVinci) as well as books about creativity methods.[2] Through the 1970's, the innovation in innovation was group-based thinking. Methods such as the Delphi Technique used expert opinion aggregation,[3] and brainstorming were all the rage. But the prevailing conventional wisdom was still that the group is only as smart as its smartest member and the techniques used were designed to elicit the best ideas out of the group. More recent notions (and research evidence) indicate that group dynamics and hive mind thinking are quite powerful, but are not well acknowledged. Today, we have evidence that, when it

comes to taking on challenges, groups made up of "normal" people often outperform those made up of people with the "right stuff."[4] While golf may be a solitary sport and hitting home runs is too, building an iPhone is clearly not. At its best, innovation is more than a team sport — it is a networked, collaborative adventure, and if we can begin to imagine new paradigms for collaboration, and the appropriate models for leadership within collaborative teams, we'll be more likely to find the kind of success demonstrated by MRF.

Until this decade, the ability to use technology to enable networked innovation was very limited. The primary technologies used to facilitate group innovation were paper and, more recently, the whiteboard and dry erase marker. Certainly telephones and faxes helped link people, but the utility of a live call diminishes quite rapidly as the number of participants grow. However, a great deal has happened in the past decade that is revolutionizing collaborative innovation. New communication and collaboration platforms, media, and tools now allow many-to-many collaboration at a scale and cost that could never have been achieved in the past. The Internet, an overnight success three decades in the making, along with its younger cousin the Web, really does change everything. For the first time, we now have tools that enable the free exchange of information across many individuals with remarkably low friction. As a thought experiment, imagine a single person or non-networked organization answering hundreds of inquiries per day in a productive and effective fashion. In the industrial-world paradigm, this would require dozens, even thousands, of customer support representatives. It would probably feel a lot like calling an airline. And yet a technology-enabled organization like Google responds to over 200 *million* search queries per day with sub-second response time: new technologies can change our sense of what can be done at scale.

New communication and collaboration platforms, media, and tools now allow many-to-many collaboration at a scale and cost that could never have been achieved in the past.

Unfortunately, by seeking the rare brilliance of a limited few instead of the statistically likely success of the connected many, the "lone genius" worldview has limited our ability to make meaningful progress in everything from technology, to organizations, to education, and all the way to society. We've done very little to systematically develop technology to support the innovation process. Overall, we are still in the "horseless carriage" days of living in a truly networked world. We can do better, but how do we begin to engage this new way of being? We believe a path to the future can be found by paying conscious attention to evidence of what works in the world today, and by asking the following questions as we work:

- What are some of the enabling collaborative tools available today?

- What lessons can be learned from organizations doing networked innovation?
- How do things get done in a networked world?

WHAT ARE SOME OF THE ENABLING COLLABORATIVE TOOLS AVAILABLE TODAY?

As mentioned earlier, many of the new approaches to collaborative leadership and innovation are enabled by a foundation of Internet and Web technologies and offerings. These help people come together across time and space, at an extremely low cost. Critically, they allow for the aggregation of like-minded people, who may be geographically or politically dispersed, to find each other and engage in discussions and transactions of many various types.

There are many new collaborative tools that can be used for innovation:

Instant messaging. The ability to easily send short messages back and forth to others who are present using computers and mobile devices. To grasp the scale of this communication mechanism, in China during the 2007 New Year's Celebration, more than 16 billion instant messages were sent via cell phones.[5]

Conference calling. Previously only available to corporate entities, now virtually anyone with a connected computer can initiate and participate in a conference call with others worldwide. We recently held a conference call with 25 people on the line, and the give-and-take of that conversation was an order of magnitude richer than what we would have experience via 25 separate phone calls.

Video conferencing. This is the addition of live video to conference calls or one-to-one messaging, a prime example being Skype (free), HP's Halo or Cisco's Telepresence systems (not free, but simply amazing). Seeing the person you're talking with not only helps build an empathic bridge, but greatly facilitates the transmission of visual data—in our experience, showing a prototype of a new product to someone is difficult, but easy on-screen.

Shared whiteboards and documents. These allow people to interact in real time and share documents, photos, drawings or presentations where anyone can edit or annotate the shared media. It reinforces collaboration and iteration. You know the saying "a picture is worth a thousand words"? It's true. Just imagine: with each photo you show, your meeting could be 1,000 words shorter!

Virtual spaces places. Web offerings such as *Second Life* (see case narrative by Cory Ondrejka in this issue) and Kaneva that allow people to interact in real time within a virtual three-dimensional world, are influencing the ways social and business networks evolve. One of us recently put together a lesson plan for a class at Stanford University by holding a very productive session by meeting in a city that you can only find inside of a popular massively multiplayer online game. Sure, we could have met instead at our local Starbucks, but we felt the stimulating environment of this online fantasy world would better help us uncover an innovative approach to the class. And we did it from the comfort of our own living rooms.

Wikis and blogs. Web tools that have become widely available in recent years, making publishing quick and easy. They encourage dialogue and sharing, via asyn-

chronous posting of comments, documents, discussions, and editing of shared media. Both of us publish frequently to blogs and wikis, and as a result have been able to make connections to people in Europe, Asia, and Africa who we would otherwise never have met. Blog search engines, such as Google Blog Search and Technorati (to name only two of many), allow people to easily search a huge quantity of very dynamic information. Technorati claims to search 103.6 million blogs and over 250 million pieces of tagged social media, and they do this with a very small latency period, versus the longer search frequency of standard search engines. This allows for blogs to serve as an early warning system for everything from wars to pandemics, and even celebrity sitings.

Question and answer sites. Many websites, such as Yahoo Answers, Windows Live Q&A, Wondir.com, and Ask the Imam, allow groups of people to easily share their knowledge and create new value. Recently, one of us had a nasty problem with the burglar alarm of his 1989 car waking the neighborhood night after night. After posting a question on a car repair Q&A site, he received a detailed step-by-step guide with photos on how to easily deactive the alarm written by a mechanic with over 30 years of experience.

This is not meant to be an exhaustive list of collaborative technologies. And for those of you who live on the Web (or who have teenagers who do so) it may seem downright obvious. But, in our experience, even these simple tools can have a powerful energizing effect on the ability to innovate in a networked fashion.

WHAT ARE SUCCESSFUL EXAMPLES OF NETWORKED INNOVATION EXTANT TODAY?

Barring an unforseable calamity that causes a reversion to old technologies and cultural norms, the changes just described will only continue. Examples of organizations that are using this new approach to leadership and innovation in a networked world are very diverse, but we'd like to highlight the following:

Global Social Business Incubator (GSBI). Based at Santa Clara University, it provides an innovative mix of both physical and virtual collaboration and education to enable social entrepreneurs to scale their endeavors and achieve sustainability. GSBI has a two week "course" they offer each year, as well as pre and post-course mentoring and collaboration using a wiki platform with a distributed network of experienced entrepreneurs and business experts who volunteer to help the social entrepreneurs grow their organizations through better business plans, financial models, improved presentation skills and fundraising strategies.[6]

Innocentive. A commercial spin-out of Lilly, it uses a network of researchers and scientists to speed up scientific and medical discoveries. Innocentive provides an online innovation marketplace to bring together "seekers" who want solutions to problems in the sciences (physical, math, chemistry, life, and computer), engineering and design, business and entrepreneurship, with 125,000 "solvers" located in 175 countries around the world. The "seekers" offer cash rewards for solutions to their problems that are meaningful to individuals. They provide an anony-

mous system for linking these two groups and for safeguarding the intellectual property. They encourage non-profit organizations to use their service and are beginning to move from a one to one relationship to the development of a community collaboration model.[7]

Meetup. By providing tools anyone can use, this group brings virtual and physical worlds together to foster collaboration and action. Meetup completely levels the playing field for people to first meet through the web, and then gather in person, usually at a public location, and explore their mutual interests, whether they be yoga, classical music, or bulldogs. This company was very instrumental in the last US Presidential campaign, and is expected to be even more useful in the next one by allowing grassroots organizers to publicize their interests and find like-minded people to collaborate with.[8]

Mozilla Foundation. Enabling a network of open source contributors, the group guides development of the extremely popular Firefox web browser. Mozilla works with thousands of people to deliver Firefox and a variety of other offerings. In an interesting evolution of the open source software development model, these people contribute not only to the code base, but help with go-to-market activities as well.[9]

Wikipedia. An open source encyclopedia on the Web that is changing the way we reference information and ultimately, collaborate. Unlike traditional compendia, it is written in a collaborative fashion by its readers, no matter who they are or where they might be. In a true open source fashion, Wikipedia is constantly being updated by massive numbers of people working in parallel, so individual entries are kept up to date, and errors can be surfaced and corrected quickly. It is perhaps the leading example of a wiki in action.[10]

X PRIZE Foundation. A group using competitions and prize models to accelerate innovation. Although the prize model is not new (per Wikipedia, between 1907 and 1919 the Daily Mail newspaper in the UK offered 14 prizes for various achievements in aviation), because of the Web and modern media, the scale and reach of the X Prize Foundation is unprecedented. They are branching out from their first prize in human spaceflight to many new domains including genomics and automotive challenges. As with Mozilla and Meetup, the X Prize Foundation is not a network *per se*, but rather a central node in a network of its own making. Their primary contribution is to encourage others to collaborate in order to solve extremely difficult challenges.[11]

Clearly, there is a great deal of variety in how these examples create and enable collaboration. In fact, there is a continuum from the most highly collaborative groups such as Wikipedia and Mozilla, and those that are using collaborative tools but dealing more on a one-to-one, or one-to-group basis for now. All of these organizations are at just the beginning of a journey, enabled by technology and great ideas, to a much more collaborative future.

Employing an Open, Collaborative Approach to Networked Innovation

Looking forward, how could the approaches described in this essay, and in other articles for this special issue of *Innovations*, change the way we do business and lead our organizations? As a person interested in innovation, ask yourself whichever of the following questions may be relevant to you. First, we will ask questions that are largely about Looking Inside your organization, then, equally, if not more importantly, we will ask questions about Looking Outside your organization's four walls:

Looking In

- What if I had the ability to gather the right people, for the right discussion, at any time? For any problem that I have?
- What if I could communicate with any employee or customer at any time?
- What if I could gather information remotely and confront problems directly, rather than through intermediaries?
- What if organizational models were more like good software is today, always in "beta" and never set in stone?
- What if anyone in my community or company could contribute in their own way to any project or problem they feel they have something to add to?
- What if leadership could be fluid and change as needed, so that the right leaders are leading the right challenges?

Looking Out

- What if I could carry a high-definition video conferencing system in my pocket and could meet face-to-face with anyone in the world, anytime?
- What if I could draw on the talent pool of literally the entire world to build the best team for a given project, without leaving my home?
- What if the right talent self-selected for any project or endeavor?
- What if leadership and new challenging ideas could come from outside the walls of my organization on an as-needed basis?

Source: IDEO

WHAT CAN WE LEARN FROM THESE LEADING NETWORKED INNOVATORS?

The central theme that emerges from these examples is the opening up of organizations to outside experts, to their customers, and to loosely affiliated supporters in many new ways. We also see that people who are passionate about something, such as individuals participating in open source development, or even civilian space aviation, will contribute their own knowledge, time and money to a group

effort without guaranty of any material reward. We learn that collective efforts, such as Wikipedia, can be even more powerful and effective than non-networked commercial efforts due to the scale and diversity of participation involved. We see emerging ways to bring the benefits of the virtual world and those of the physical world together, such as MeetUp. Finally, we see ways, such as those used by Ashoka and many other social change organizations, to find solutions to complex, globally scaled social problems which, by using collaborative networks of like-minded individuals and institutions, provide an opportunity to supercede existing political systems and governments in the name of progress. Ultimately, innovation is gradually being understood as something done by groups of people and not by lone individuals.

Open innovation, using the skills and smarts of whoever wants to contribute, is taking the place of closed innovation, even in traditionally closed businesses such as drug companies or academic research. This is clearly just the beginning, and these leading organizations are just a glimmer of what is possible. One of the authors recently led a social investment fund and reviewed hundreds of new approaches to using collaborative tools and the Web for innovation that really matters to individuals and society. Particularly inspiring has been the large number of entrepreneurs based in developing countries who are empowered by new tools and media to undertake activities that would have been previously impossible.

HOW DO THINGS GET DONE IN A NETWORKED WORLD?

Many of the examples just discussed also represent the trend of traditional models of centralized, top-down leadership being replaced by networked systems of elective action. Mozilla's open source Firefox browser is winning market share from Microsoft's Internet Explorer. Wikipedia has decimated the traditional encyclopedia industry. The power of older top-down, command and control organizational models is diminishing. Newer organizations such as Google, Amazon, eBay, the X PRIZE Foundation and many others rely on affiliations with individuals and other organizations that are outside of their direct control and their physical walls. For example, without eBay's tens of millions of buyers and sellers who voluntarily affiliate over time, it would be nothing more than an empty web store.

At a personal level, this requires a different way of being. What it means to be a "leader" in a networked context is vastly different from what we've been taught via the autobiographies of the Iacoccas and the Welches. What we've found is productive behaviors found in networked organizations where the physical and formal employment rules of the Eisenhower era are no longer valid. Joi Ito, a respected technology entrepreneur and investor, recently spoke about insights gained from leading a team of 300 real people inside of World of Warcraft (a game played over the Internet which today boasts over 8 million users) and how success there demands behavior different from that found in a traditional business organization. Joi said

> I haven't found a single MBA so far who is good at leadership in this situation. Most of the people who are good at leading here are people who are good at listening. It's actually very similar to leadership in open source… It's a kind of imagination and emotional thing… it's when you have a band or an orchestra together and suddenly you are in "the zone" and everything just feels right—you've just got it just right... When you're in the zone it just feels right and everything works together.
>
> ...thing is an indication of a behavior change. That's why it's important. It's important that we have millions and millions of people who are learning how to interact this way, and can we think up projects that tap that.[12]

Even big, successful businesses are beginning to embrace new models of leadership and innovation. John Chambers, CEO of highly successful Cisco Systems, spoke at a recent *Fortune Magazine* conference and shared his new realization that networked innovation is more than a buzzword. He has begun to change the management paradigm of Cisco to one of networked innovation; moving from traditional command and control systems to a distributed and highly networked system built on capabilities and skills rather than rank and reporting structures. Enabling this change is a suite of technological tools such as telepresence systems to replace physical meetings. Chambers is betting publicly that this change will lead to a 10% annual productivity increase for Cisco over the next decade.

People in organizations who want to be more innovative in a networked world should keep in mind five things (each of which merits its own article or wiki, so please forgive our brevity):

Raise awareness of the need to change. Many collaborative innovations have had a disruptive effect on legacy organizations. For example, eBay has threatened the intermediaries who control many existing industries, such as brick and mortar stores, used car dealers, and realtors. Similarly, Innocentive is able, with a cash reward measured in the thousands of dollars, to achieve results in finding new molecules that cost millions of dollars if done via the traditional closed laboratories of companies such as Pfizer. If individuals can imagine how collaborative innovation can eclipse their organization or industry, they can then raise the awareness of a need to change within their organization. This awareness, and willingness to act, is critically important for organizational survival, let alone continued success. However, while collaboration can not be enacted by top-down decree, without strong support from the top it is very difficult for a change of this magnitude to be successful.

Experiment with new resources and tools. There is a confusing array of resources and tools available for collaboration and innovation. Some of them are optimized for organizations, while many come from the consumer marketplace. There are few examples of best practices in the selection and use of collaborative tools, but organizations such as McKinsey, Disney, and many others are experimenting with providing these tools to their employees and outside affiliates. Web offerings such

as Amazon, Salesforce, and Google are also experimenting with providing tools and programming interfaces to outsiders in an attempt to encourage the productive use of their tools in new applications. Leaders need to ask themselves and their peers, how might they experiment with these types of tools in order to learn to apply them in a meaningful way in their own organization? This often requires changing the way that information technology is purchased and developed within a large organization, allowing the use of open source software, and encouraging the adoption of services available. There is no single solution; this will be a learning process based on prototyping and experimentation.

Learning how to work successfully in an interconnected and collaborative world is not a challenge that individuals and organizations can today avoid or ignore.

Devolop new collaborative processes. Collaborative tools alone are not sufficient. Having great ideas is also not sufficient. Organizations need to be able to take advantage of innovations that emerge from collaboration via a set of repeatable processes. This is easier said than done, as established organizations often have antibodies that emerge to crush new processes that don't easily fit. Building collaborative processes to test out innovative ideas and nurture them to the marketplace are essential. Organizations need to think about whether these processes are in place, how consistent they are with the spirit of collaboration and the norms and values they want to build, and how to shepherd them along to success.

Provide infrastructure to enable collaboration. Tools and processes are not enough; to be effective we need to change or adapt the way things get done. We've discussed how getting things done in a networked world differs sharply from the older styles of leadership still in practice today. The good news is that even the biggest of the big are starting to experiment with new behavior modes. Procter & Gamble and the Centers for Disease Control, for example, have each begun to adopt collaborative innovation. Cisco Systems, as mentioned earlier, is moving aggressively from command and control to networked and collaborative leadership. Effective networked innovation requires organizations to consider how to provide a supportive infrastructure and culture to enable collaboration and encourage its effectiveness.

Build a culture of collaboration. No one, as far as we know, has ever created a collaborative culture by issuing an edict that employees must henceforth collaborate with each other. It takes a thoughtful approach to organizational change to build a culture of collaboration that enables networked innovation to happen. This culture is relatively uncommon in most large businesses, universities and research organizations, which is why the success achieved by MRF is so exception-

al. Values, at the end of the day, speak to what organizations care about and how they ultimately make decisions. Networked innovation must create value for organizations and individuals alike in order to be considered successful and be adopted over the long-term. For example, it is very clear how dating sites, such as Match.com, create value for individuals through a collaborative way to find soulmates, or how question and answer sites such as Wondir.com create value for people wanting to help each other. We should each ask ourselves how we can build a culture of collaboration that includes aspects such as tool selection, training, incentives, metrics of success, and—perhaps most important of all—celebrations of successful collaborations and collaborators.

Learning how to work successfully in an interconnected and collaborative world is not a challenge individuals and organizations can, today, avoid or ignore. We can all shape and define a collaboration as a result of our own experimentation with new tools and methods. Fortunately, there are many motivated and engaged people out in the world facing the same challenge as each of us and seeking new collaborative partners of their own.

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