

A model for CIO-led innovation

D. L. Newbold
M. C. Azua

The CIO (chief information officer) organization at IBM has adopted the idea of a participatory Web and is engaged in leveraging employee talent to address the persistent information technology challenges facing global enterprises. A series of unique open conversations among employees resulted in a new approach to collaborative innovation. This new model of innovation has become an important component of the IBM product and service strategy, as it has generated new solutions that have met quick market success. In this paper we describe this model of innovation and illustrate our experience in four case studies.

INTRODUCTION

In 2004, the IBM leadership team was advocating a perspective on innovation that required transparent, open collaboration and global accessibility. The team wanted to demonstrate that every employee can be an innovator and to validate their conviction that innovation also requires an understanding of the business concerns; in other words, that innovation is the intersection of invention and business insight.¹

This thinking was originally tested in WorldJam, IBM's first large-scale collaboration, held in May 2001, when over 50,000 employees (or 16 percent of the IBM employee population) discussed critical issues with IBM leaders over the course of a three-day online collaboration event. It led to subsequent Jams focusing on a range of topics, such as management, the integration of PricewaterhouseCoopers Consulting (following its acquisition by IBM), the on demand transformation of IBM itself, and the IBM core values.² The Jams were followed in 2005 by the creation of the ThinkPlace* internal Web site, developed by the CIO (chief information

officer) team, where employees can post innovative ideas, get feedback from their colleagues, or sign up to help develop these ideas. The process of collaborative innovation was taking hold within IBM, and the CIO office played a leading role.

In support of the innovation process we decided to open up access to our infrastructure and provide support, without charge, to any internal innovator. We put in place a program called the Technology Adoption Program (TAP), which through a single Intranet site provides hosting services, support for current and future offerings, and support for community interactions.³ The goal is to accelerate the adoption of internal innovations by providing a proving ground and a means to quantify the business value of innovations. See Reference 3 in this issue for additional details.

©Copyright 2007 by International Business Machines Corporation. Copying in printed form for private use is permitted without payment of royalty provided that (1) each reproduction is done without alteration and (2) the Journal reference and IBM copyright notice are included on the first page. The title and abstract, but no other portions, of this paper may be copied or distributed royalty free without further permission by computer-based and other information-service systems. Permission to republish any other portion of the paper must be obtained from the Editor. 0018-8670/07/\$5.00 © 2007 IBM

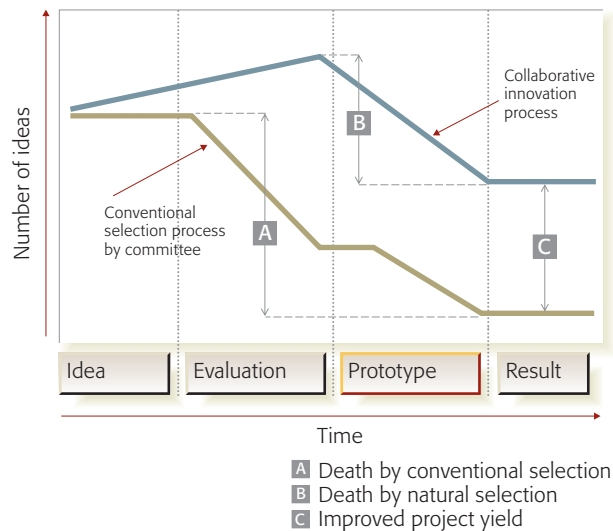


Figure 1
Collaborative innovation versus conventional selection

The CIO team undertook the task to articulate the business case for investing in the new innovation program by developing a vision of its possibilities. The team put together a white paper, titled the *2010 CIO Outlook*, which has helped both innovators and CIO technical leaders understand how to use the new innovation model to achieve business goals without large investments. Articulating the strategy was key both to management support and for steering the innovation process itself.

The *Outlook* was developed early in 2006 in addition to the traditional annual technology strategy documents. Its goal was to seek a new approach to some important enterprise-wide challenges, such as information discovery, radical flexibility in the IT infrastructure, and adoption of best practices for common tasks. The resulting strategy reflected the patterns emerging on the Web: of open enterprise data reuse, capture of the contributions of employees everywhere, change to simple and powerful Web-based tools, support for customization, reward sharing through increased visibility and enhanced reputation of contributors, and sharing results with partners and clients. This strategy relies on implementing a service-oriented architecture (SOA), adopting Web 2.0 patterns that fit our enterprise culture, and a track record of delivering hosted Web applications that are scalable.

The rest of this paper is organized as follows. In the next section we describe the new model for

innovation and its evolutionary characteristics. We also describe the innovation process by briefly describing its various steps. In the following section we discuss four case studies: a social bookmarking service, a tool for managing remote meetings, an enterprise directory application, and an advanced instant messaging (IM) application. A discussion and conclusion follow.

THE NEW MODEL OF INNOVATION AND AN EVOLUTIONARY POINT OF VIEW

As *Figure 1* illustrates, when the CIO Technology and Innovation evaluation team switched from the conventional “committee evaluation” model to an “open collaborative” model, the number of selected projects increased drastically. For example, whereas in 2003, with the conventional model four projects were selected from an initial set of 28 projects, in 2006 the TAP community yielded 48 projects. Part of the increase was due to sharing the initial ideas on the ThinkPlace Web site and then letting those ideas mature in TAP. Much of the increase was due to opening up participation to many more employees.

The shift to collaborative innovation has been gradual over the course of the last 10 years as the IBM business model has evolved beyond that of the e-Business era and IBM has become a services company. Meanwhile, the consumer Web has been in the midst of a sophisticated evolution, which Tim O’Reilly named Web 2.0.⁴ One of the tenets of Web 2.0 is *users add value*, which is consistent with our approach to collaborative innovation.

As economist Eric Beinhocker⁵ has suggested, many of the attributes of the evolutionary paradigm “differentiate, select, and amplify” can be applied to the process of business innovation: the creation of order from randomness (selecting trends), discovery of fit designs (community response to innovations), continuous adaptation (collaborative innovation), the accumulation of knowledge (best practices), the emergence of novelty (deployment), and the growth in resources devoted to successful designs (user acceptance and extension of the innovation). Evolution is inherently chaotic and assumes many parallel experiments, many of which will never achieve success.

While innovation often assumes inspiration, it can be accelerated and amplified with an accepted process of collaboration and selection leading to

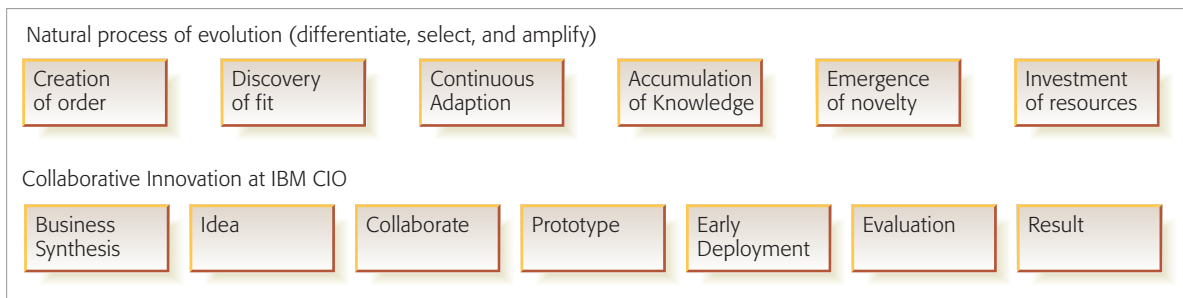


Figure 2
Innovation process

investment. We have sought to embed community participation at every stage in our process and defer formal evaluations until a significant investment is required. The process parallels the natural selection process described by Beinhocker. This process is not always sequential, and often, innovations can emerge in any phase, as we show in the case studies below.

The innovation process is shown in **Figure 2** and parallels the natural selection process described by Beinhocker. It consists of the following steps.

1. *Business synthesis*—Although the initial stage often goes unrecognized, it is important. It consists of the integration of business requirements and technological opportunity. At IBM the information sources are often executive communications (as presentations, strategy documents such as the *2010 CIO Outlook*, blogs, webcasts and podcasts) in addition to news posting on our Intranet portal site. A recent addition to sources of information on technology is a community-supported technology-tracking site that covers information about emerging technologies, tracks their development, and documents the current plans for adoption. The site facilitates contacts between innovators and known experts.
2. *Idea*—The ThinkPlace Web site is a central site where employees can share ideas, start collaborative refinement of these ideas, and get help in developing and deploying them. This program demonstrates that everyone can be an innovator—a critical message to deliver to employees. It also has reformed our process of innovation from that of a sole inventor who “throws ideas over the wall” to a system of collaborative “evangelism” (advocacy) in which the innovator needs to

seek support and recognition from a community before assistance is rendered. A volunteer team of veteran innovators, known as ThinkPlace catalysts, monitors the community ratings and selects the top ideas to support and bring to the attention of managers who could further support the development of prototypes. Naturally, ideas get refined in many venues, such as e-mail, blogs, IM, and wikis.

3. *Collaborate*—We use a wide variety of platforms for collaboration when refining an idea, and all of them have a role in the innovation process. Newsgroup forums, e-mail, IM, and Lotus* Notes* teamrooms are the basic platforms. Blogs, wikis, virtual worlds, and Web seminars are popular, too. Many communities sponsor weekly or monthly conference calls to discuss new ideas; the CIO architects sponsor a weekly Think!* seminar, loosely organized by wiki, that has been running for years. Many of the TAP innovators join these venues, seeking immediate feedback or advice. ThinkPlace catalysts have weekly innovation circles to collaborate on ideas.
4. *Prototype*—Our TAP program provides open hosting for applications, but often help is needed with the technical execution. In addition to fellow innovators, our Research Division, interns, and academic partners, we have two other programs that frequently make a big difference. The first is an academic internship program called Extreme Blue,* which runs throughout the year and provides small teams of computer science, electrical engineering majors, and candidates for M.B.A. degrees with support for developing and packaging an idea. The other is BizTech, a similar program for early tenure employees; they commit 20 percent of their time to work in small teams on an innovation project.

Table 1 Distribution of employee participation in ThinkPlace and TAP by geography

Program	Americas	Europe (including Middle East and Africa)	Asia (including Australia and New Zealand)
ThinkPlace (idea stage)	53%	20%	27%
TAP (pilot deployment)	83%	13%	4%

5. *Early deployment*—The TAP program provides a variety of services for innovators from hosting to evaluations. The hosting support ranges from a simple Web application environment to an enterprise-grade virtual server cluster. The intention is to provide a graduated set of options that will lead innovators to mature and scale their innovations to production quality within the confines of the TAP program.

These services are “self serve,” and approval is easily obtained. The typical agreement provides free hosting for six months, following which an evaluation is required. In the first year in which it was offered, over 2000 innovators registered for access to services and hundreds created server accounts.

As of this writing, two years after the introduction of TAP, 73,000 early adopters have registered and have downloaded innovations (from a global population of approximately 350,000 employees). The impact of TAP in other communities has been significant; our Research groups use TAP to study user acceptance of their ideas, and product teams use early adopter participation to evaluate and refine products before their release.

6. *Evaluation*—Innovations are evaluated by a TAP assessment team. Early adopters are surveyed before and after downloading an offering. Innovations “On Deck” are evaluated by first adopters, a rotating team of early evaluators that provides prelaunch feedback to innovators and insight to the TAP promotion team. All adopters are invited to rate and comment on the innovation. E-mail and newsletters keep the community informed of new releases and “hot” innovations. Formal evaluations are scheduled at the end of the six-month deployment cycle and the innovator receives a candid assessment of his or her success; this can include detailed system perfor-

mance data to support direct transfer to production hosting or a user survey to support future investment.

7. *Result*—The disposition of innovations ranges from quick failure to production of a new offering. Success can range from internal production to creation of a new product or service, to papers or patents or reemerging as a new, more mature, innovation. Although it is still too early to provide reliable yield data, we have had quite a few successes. Many have been withdrawn due to lack of interest. Most continue to be developed and are still in the TAP program.

Over the course of developing our emerging technology process, we had many discussions with analysts and clients, most of which remain confidential. We reviewed many formal committee evaluation approaches, ranging from tightly structured centralized processes with dedicated staff to loose, decentralized approaches. However, IBM emerging technology talent was widely distributed and loosely coordinated across divisions, hence the appeal and fit of the Web 2.0 style of user participation to our business model and culture.

Global participation is our goal. *Table 1* shows the distribution of ideas submitted to ThinkPlace and TAP deployed projects over the three major geographical areas: the Americas, Europe (including Middle East and Africa), and Asia (including Australia and New Zealand). The figures are based on the total number of ideas or projects after the first two years of the programs to June 2007. The numbers show an uneven distribution, which we are attempting to even out. Both programs were managed from sites in the United States, so we expected greater TAP pilot participation from the Americas, since this requires significant interaction with the innovation hosting staff. It is worth noting that a large portion (18 percent) of our ThinkPlace participation is from India, where we have a large population.

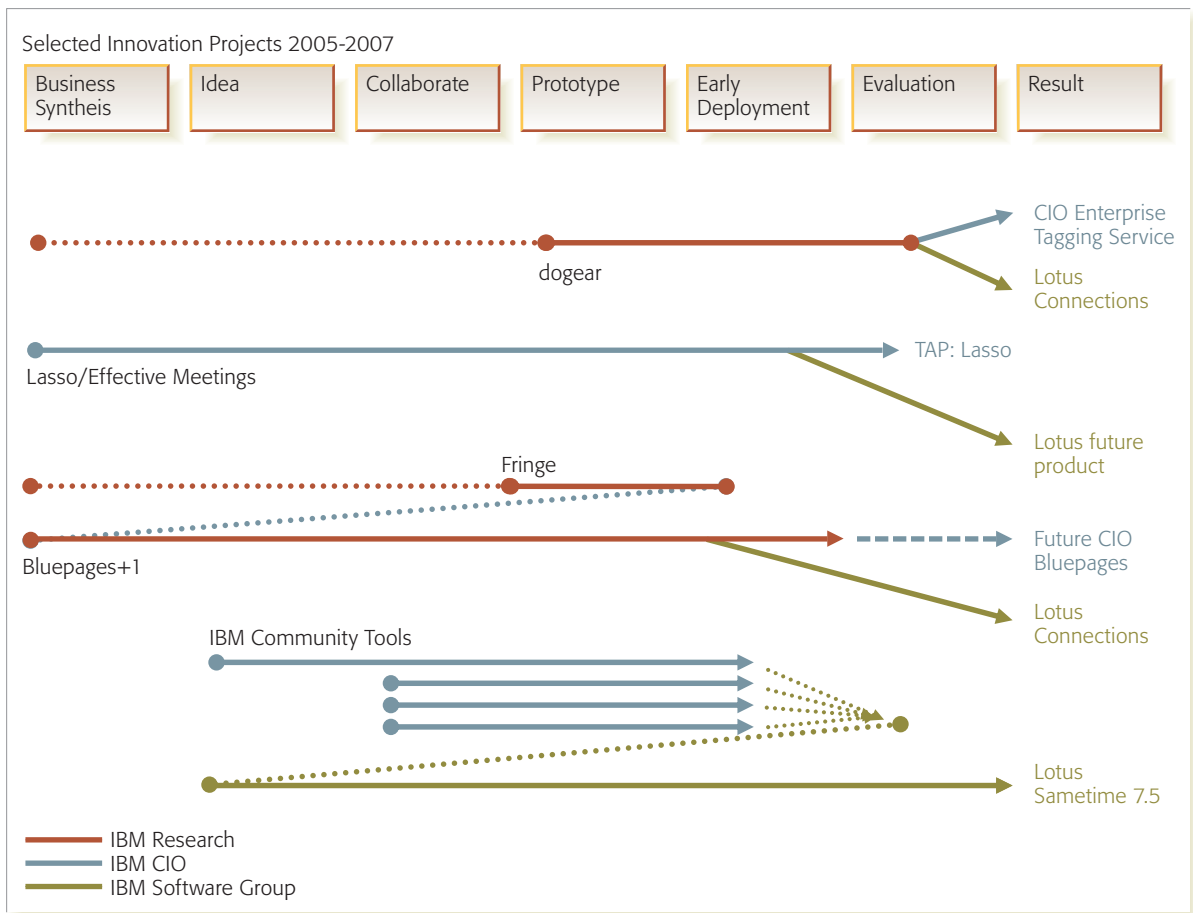


Figure 3
Actual process path of selected case studies

SELECTED CASE STUDIES

In this section we discuss four projects that were produced by the innovation process we described above. All these projects graduated to current or planned products. **Figure 3** illustrates the actual process sequence of the case studies discussed below.

Dogear: A social bookmarking service

The dogear function is a social bookmarking service developed by Jonathan Feinberg of the IBM Research Collaborative User Experience (CUE) group.⁶ Modeled on the Internet bookmark service del.icio.us**,⁷ dogear was extended first by integrating it tightly with our corporate directory and then by providing utilities that encouraged tagging, sharing, discovery, and other functions. The project was initiated within the CUE research team, who took the best of the emerging consumer Web services and adapted them to the enterprise.

The CUE team joined with the CIO team for testing the enterprise adoption, and we quickly embraced the service and provided hosting. As Feinberg et al. reported in a recent paper,⁶ the adoption was rapid. It was a case in which the research team recognized a latent need and responded with a well-designed solution, and the CIO team contributed by amplifying the response. As a result the CIO office built an enterprise-scale back-end service that supports the demand for function and extensions sought by other applications, including our enterprise search application. An additional result was the incorporation of the dogear function into the Lotus social networking product, IBM Lotus Connections. The entire process from initial design to deployment took 18 months.

Lasso: A tool for managing remote meetings

Without funding, but with the idea to address a common business productivity problem, Will Mor-

risson of the CIO team initiated work on managing remote meetings and bringing all its elements together in a dedicated Web site. Will gathered the requirements, researched available technologies, collaborated with colleagues on ThinkPlace, forged partnerships with component providers, and produced a prototype by joining with a Marist College development group. The prototype, which later became Lasso, was tested by a small group of early adopters on TAP. Further development was supported by other groups, who contributed presentation and IM components. This initial deployment was an immediate success, and the prototype was put to use in supporting a large internal conference. All during the process, other employees provided feedback through surveys and forum participation. The feedback helped to prioritize the various features, and some of these were discarded.

The deployment of Lasso increased; currently, more than 5000 moderators are using it on a free hosting server. Recognizing its potential, executives in the CIO office and the IBM Software Group (SWG) have agreed to turn the project over to SWG to become a future offering.

Fringe: An enterprise directory application

IBM has a very popular enterprise directory and employee profile application called BluePages. It provides the usual directory, contact, and organizational information and has been extended over the years to include information on skills, patents contributed, community affiliation, matrix management relationships, as well as photos and résumés. Much of the profile information is manually added by the employee on a voluntary basis. Like many other enterprises, we have long sought automated means to include this information to aid in expertise location and team formation.

Steve Farrell from the Research Division created Fringe, an experimental application that made relationships between employee profile records apparent visually. He partnered with the CIO team to investigate whether link mining and automatically populating the profile could further enhance the prototype. This resulted in only limited improvement. Meanwhile, Fringe had accumulated many new features and the presentation became complex. In 2005, it was jointly decided to start anew and redesign the tool based on a refined

understanding of the requirements. A CUE designer, Eric Wilcox, joined the effort and helped produce a dynamic version of Fringe that employed AJAX (Asynchronous Javascript** and XML) techniques and enabled the dynamic presentation of the features of the tool. The result was the single-page interface shown in *Figure 4*, which became a vehicle for experimenting with various features, such as person tagging, testimonials, tag clouds, and group lists. The prototype was deployed through TAP in early 2006 as BluePages+1. Over the course of the following year, dogear content tags, explicit connections (known as “friending”), and geographic and network tag views were added.

As one of the first participatory mash-ups within IBM, BluePages+1 was a big success. Thousands of early adopters demonstrated the value of indirect profiling through tags. This feature is planned for a future production version of BluePages. BluePages+1 is also the basis for the profiling feature in Lotus Connections. Over the three-year course of this project, a project wiki and the internal blogging community were used for community feedback.

IBM Lotus Sametime 7.5: An advanced IM tool

IBM Community Tools (ICT) was developed by the IBM WebAhead team as an advanced IM tool. IBM WebAhead is the organization that focuses on the identification, development, and evangelization of emerging technologies for IBM use. Konrad Lagarde and his team started by adding a publish and subscribe system to the IM tool and built a topical question and answer system, which later evolved into a full broadcast suite with directory lookup and presentation sharing capability. Extending the functionality of the prototype was limited to the WebAhead team until a plug-in application programming interface (API) was exposed. Then, other developers started to add functionality such as chat history, auto responders (which automatically send a reply to an incoming message), and support for other IM protocols. Later ICT was redesigned and implemented in Java**, which made the tool even more flexible.

The CIO team, which was looking to fund a voice-over-IP conference-call-control prototype, decided that ICT was the best vehicle for this and informally urged developers and the WebAhead team to add services such as location awareness. The collabo-

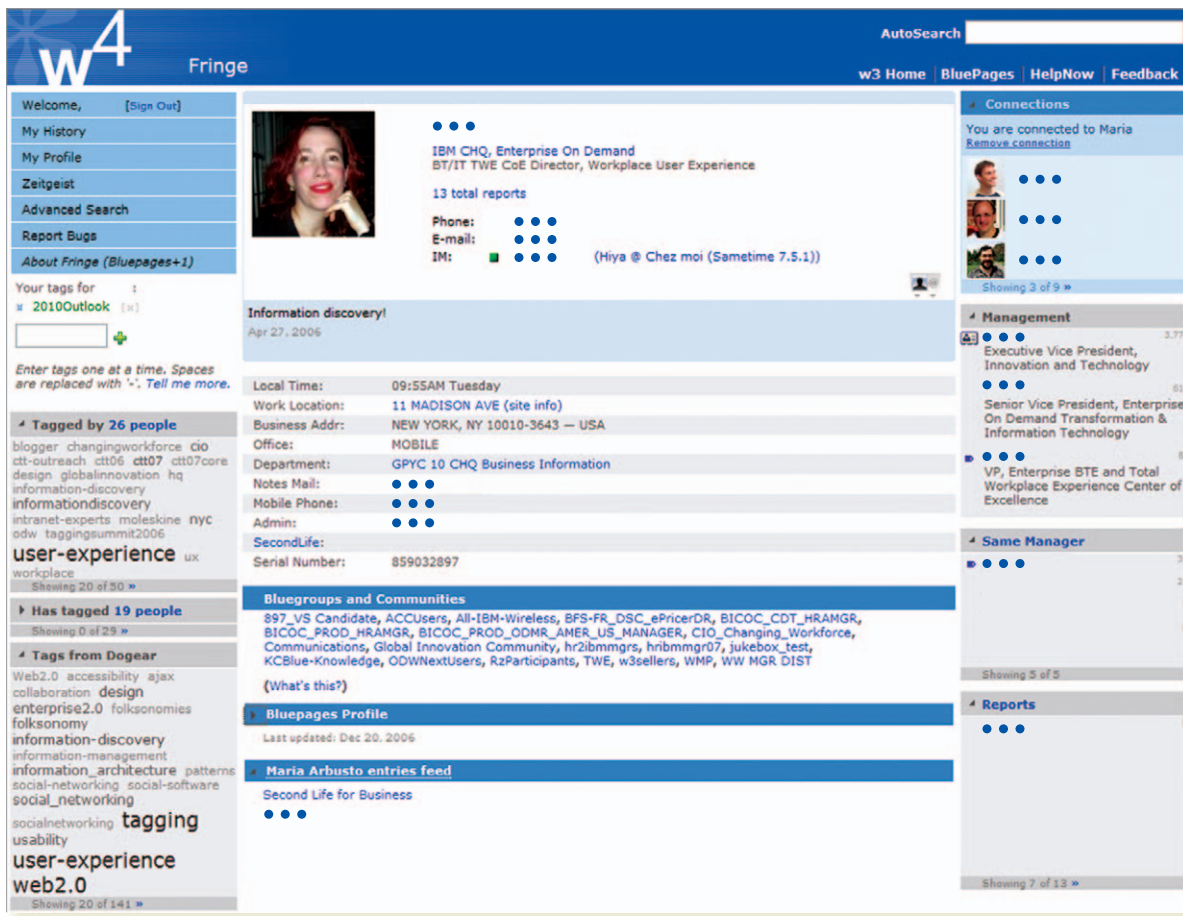


Figure 4
BluePages+1: user interface

ration thrived, and soon IBM clients began to hear about the feature set. The CIO team was, at the same time, concerned about the proliferation of IM clients, some of which were suspected of causing infrastructure instability.

To leverage the innovative tool and to meet client demands, the Lotus division decided to integrate all the IM client features into a single ICT-based offering. The result, Sametime* 7.5, was refined by way of TAP. Sametime was declared a strategic platform and the development effort was expanded, which resulted in a larger user base and many new plug-in functions. Today, Sametime is a market success, and the innovation continues within and outside IBM. This process took more than five years to unfold and highlighted the need to be patient with emerging platforms and their potential to galvanize innovation.

DISCUSSION

Over the last few years the activities discussed in this paper have established a visible path from inspiration to success and a process in which every employee can participate. They have changed our view of the inventor from hero to collaborative innovator. Our intent was to involve all our employees in solving our most persistent IT challenges and in improving their work experience.

We believe the way to achieve this is by first opening up enterprise data, then by moving the remainder of our application infrastructure over time to simpler hosted interfaces and creating component application pieces that can be reassembled into task-oriented templates. One key element is an implementation of the Unified Activities Management (UAM) project.⁸ UAM is an organizing

framework for supporting collaborative work that is focused on personal-scale processes, formal or informal. In practice, UAM will provide a list that contains tasks, resources, people and even the computing context for the task. We have been supporting the integration of the Open Activities pilot within IBM and its integration into various collaborative platforms, such as the Lasso/Effective Meetings project. We anticipate employees sharing their recipes for tasks and eventually embedding these into the templates for a workspace.

The IBM CIO organization is unique in having the support of a major research division, being an organization within an IT vendor, and having many channels for delivering value beyond our employee base. The success of this department depends upon the culture of trust and mutual support that IBM cultivates.

Software exchanges are already available to distribute and market internal innovations that extend enterprise (software) solutions. As Eric von Hippel has described in *Democratizing Innovation*,⁹ both firms and individual consumers are increasingly able to innovate and thus participate in the creation of products, which leads to better fit and loyalty. We see opportunities for all IT enterprise organizations to participate in software exchanges, marketing an extended version of a commercial application. Such exchanges could function either under the auspices of the application vendor or independently of it.

Most commentators on *Enterprise 2.0*, including Andrew McAfee¹⁰ (who coined the term and defined it as the “use of emergent social software platforms within companies, or between companies and their partners or customers”) assume the inevitability of these participatory Web patterns within an enterprise over time. Our intent is to broaden this innovation process in order to achieve its full business potential. However, technical and cultural obstacles lie ahead, including: opening enterprise data for reuse; Intranet security; identity management; using storage which is massive, reliable, and inexpensive; and negative attitudes towards tagging and other sharing.

CONCLUSION

For the past three years we have observed a steady stream of collaborative innovation that has achieved

significant business value at relatively low cost. Although predicting continued success is risky, the human desire to engage and the inclination to customize tools are strong. We believe that evolution applies to the collaborative innovation process, and if we allow it to work, we have a methodology to differentiate, select, and amplify. Creating the environment and the support for collaborative innovation is the contemporary challenge for the CIO organization.

ACKNOWLEDGMENTS

We thank Brian Truskowski for his leadership and support. We also acknowledge Sandesh Bhat, Amy Chow, Brian Goodman, and John Rooney for TAP; Maria Arbusto, Paul Baffes, Alfred Bentley, Colin Crehan, Jean Healy, Aroop Pandya and Peter Rodriguez for their contributions to the ThinkPlace Website; Steve Farrell, Tessa Lau and Eric Wilcox for their contributions to BluePages+1; Will Morrison, Kyle Himmerick and Bill Quinn for their contributions to Lasso; Jon Feinberg, David Millen, Irene Greif, and Michael Muller for their contributions to dogear; and Konrad Lagarde and the entire ICT community for their contributions to Sametime 7.5. Finally, we gratefully acknowledge the partnership with our Lotus colleagues, and especially Charlie Hill, Carol Jones, and Mike Rhodin.

*Trademark, service mark, or registered trademark of the International Business Machines Corporation in the United States, other countries, or both.

**Trademark, service mark, or registered trademark of Yahoo!, Inc., or Sun Microsystems, Inc., in the United States, other countries, or both.

CITED REFERENCES

1. F. Johansson, “The Medici Effect: Breakthrough Insights at the Intersection of Ideas, Concepts, and Cultures,” Harvard Business School Press, Boston, MA (2004).
2. P. Hemp and T. A. Stewart, “Leading Change When Business is Good: An Interview with Samuel J. Palmisano,” *Harvard Business Review* **82**, No. 12, 60–70 (2004).
3. A. W. Chow, B. D. Goodman, J. W. Rooney, and C. D. Wyble, “Engaging a Corporate Community to Manage Technology and Embrace Innovation,” *IBM Systems Journal* **46**, No. 4, 639–650 (2007, this issue).
4. T. O’Reilly, “What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software” O’Reilly Media, Inc. (September 30, 2005), <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>.
5. E. Beinhocker, “The Origin of Wealth: Evolution, Complexity and the Radical Remaking of Economics,” Harvard Business School Press, Boston, MA (2006).

6. J. Feinberg, D. R. Millen, and B. Kerr, "dogear: Social Bookmarking in the Enterprise," *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems 2006*, April 24–27, 2006, Montreal, Canada, pp. 111–120.
7. Del.icio.us, Yahoo!, Inc., <http://del.icio.us>.
8. T. P. Moran, A. Cozzi, and S. P. Farrell, "Unified Activity Management: Supporting People in e-Business," *Communications of the ACM* **48**, No. 12, 67–70 (2005).
9. E. von Hippel, *"Democratizing Innovation,"* MIT Press, Cambridge, MA (2006).
10. A. P. McAfee, "Enterprise 2.0: The Dawn of Emergent Collaboration," *MIT Sloan Management Review* **47**, No. 3, 21–28 (2006).

Accepted for publication June 13, 2007.

Published online September 25, 2007.

David L. Newbold

IBM CIO Technology & Innovation, 1 Rogers Street, Cambridge, MA 02142 (dnewbold@us.ibm.com). Mr. Newbold, a Distinguished Engineer, leads the CIO Technology Team responsible for accelerating innovation within IBM. Before joining the IBM CIO organization, he designed and developed Internet, search, and knowledge management products for Iris Associates and Lotus Development.

Maria C. Azua

IBM Corporate Headquarters, 294 Route 100, Somers, NY 10589 (azua@us.ibm.com). Maria Azua, Vice President of Technology and Innovation for the IBM CIO Office, is responsible for the development and integration of innovative IT solutions through collaboration with the IBM Research Division and the IBM lines of business. She is also responsible for enhancing the IT infrastructure of the company and for improving the productivity and the work experience of IBM employees through innovation. Before joining the CIO team, she was the Director of Technology Evaluation at IBM, responsible for corporate assessment of new technology opportunities. She has chaired the IBM Finance Sector Industry Solutions Architecture Board, and managed the integration of industry standards for the finance sector within the IBM Software Group. As solutions architect for e-business, she provided IBM technical leadership for many large customers in the financial sector, and she is well-recognized for her technical leadership in home-banking solutions. She graduated magna cum laude from the University of Puerto Rico with a Bachelor's degree in physics and mathematics. She has a Master's degree in computer science from the University of Miami and an M.B.A. degree from Florida Atlantic University. In addition, she has 48 patents and 41 pending patents that span a wide spectrum of technologies including telecommunications, Web servers, and transcoder technology. The Society of Hispanic Professional Engineers awarded her the Star Award for her contributions and dedication to the Hispanic community. She was inducted into the Women In Technology International Hall of Fame, and named one of the "100 most influential hispanics" by People magazine in 2006. ■