Conference Report

FIRST ANNUAL LEVERAGING CYBERSPACE CONFERENCE
Palo Alto, CA
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Report prepared by

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1. Introduction

The Internet is becoming a distributed, massively parallel supercomputer that connects people, processors, information repositories, and mobile code. People with shared interests are using the Internet to solve problems, accomplish tasks, and create resources that would be well beyond the reach of any one person or organization. The Internet is being used to create virtual libraries, factor large numbers, organize massive volunteer efforts, and filter information in a collaborative fashion. The ability to leverage the efforts of large numbers of networked users has important economic, social, and political consequences.

This conference was designed to explore the phenomenon from both a technical and social science perspective. Topics included: technologies that can support wide-area collaboration (e.g., distributed computing, Computer Supported Cooperative Work (CSCW), intelligent agents); case studies of successful and unsuccessful efforts to leverage the contributions of many networked users; implications for business strategies in information technology, software and networking; and proposals for "leveraging cyberspace." A paper by Tom Kalil, "Leveraging Cyberspace," served as the initial framework for planning the conference. That paper is available at <http://nii.nist.gov/cyber/cyber.html>.

The conference was sponsored by the White House National Economic Council, the Department of Commerce's National Institute of Standards and Technology, and the Xerox Palo Alto Research Center. The meetings were held at Xerox PARC, October 8 and 9, 1996.

A Web site was established for the conference. It is no longer interactive, but materials are available as archived files at <http://nii.nist.gov/cyber/cyber_conf.html>.

2. Conference Summary

Because of short lead time, the conference was based on invited papers. Further, the bulk of communications, including notices about the conference, were distributed in electronic form, as Web or electronic mail announcements.

Tom Kalil, Senior Director of the National Economic Council, opened the conference with remarks to challenge the conference attendees. Among his points were the following: we must leverage the small efforts of many; we need shared ontologies that go beyond hypertext markup languages; and we need to move beyond the current fascination with the hardware and software. Some 26 hours later, Kalil led the same group in a brainstorming session. One issue that seemed to solidify in the minds of many of the conference participants concerned the "social mind" and the need to

support the growth of social capital. We were reminded that a human network precedes electronic networks. However, human networks will not automatically translate to electronic networks: we need to establish fiber-optic networks that can become residential fiber-optic networks that can become residential fiber-optic communities. Many of the comments during the final session focused on increasing the value for cyberspace. We need to create networked communities, build bridges to community organizations, form a corps of volunteers to assist neophytes and to champion new uses of cyberspace, measure the benefits of using the Internet, and broaden the use of the Internet to include social scientists, particularly those from the "hard" social sciences.

3.   Highlights From the Keynotes
3.1   John Seely Brown, Vice President and Chief Scientist, Xerox Corporation

John Seely Brown's first theme was expanding the design for cyberspace He used images to clarify his concerns. For example, he showed how the porch of a house allows us to extend our awareness of the world without being overwhelmed. Likewise, the use of the area on a computer monitor can provide explicit information in the center that we attend to and additional implicit information on the periphery to which we are attuned. Continuing, Brown emphasized that the key was seamless transitions between the center and the periphery. From the porch one enters the house; a transition takes place but one has a feeling for the space.

In contrast, using Brown's homey analogy, when searching the Web, we tend to use toilet paper tubes on our eye glasses. This gives us only a very limited view of what is available. More appropriate would be to use all the space available. Brown showed an interface using all the screen space, including depth. People are aware of what is going on around them because of peripheral vision; in the center we see the objects while on the periphery we notice motion. The user is part of the space through awareness and attuning rather than attending to it. This part of the keynote ended with the conclusion that we should use the subtle approach to design allowing the user to attune to the implicit information on the periphery.

A second theme was the need to capture and leverage intellectual assets. Here Brown's examples included capturing the knowledge and expertise of senior citizens while they mentor kids and capturing and peer reviewing information provided by technical representatives.

Brown presented the need for a power shift as his third theme. He showed that we now have systems for supporting individual minds but that we need systems for supporting social minds. Rather than supporting individuals, we need to tap the knowledge and expertise of those individuals. Thus with systems providing filtering and refining algorithms, we could have systems for supporting social minds.

3.2   Bob Metcalfe, IDG/InfoWorld

Bob Metcalfe looked back over the day and one-half as he reiterated salient points presented by the panelists and attendees. Metcalfe said that tools for the web are blossoming and undergoing rapid change. He expressed concern about the research going on in academia. However, he did not address the issue of commercial products meeting the needs of scholars or other communities of users; perhaps it is not necessary for the software created in academic situations to be marketed for them to be valuable.

Metcalfe also said that expertise networks are being built willy-nilly on the web. He took exception to the idea of "winner takes all" especially as we move towards decentralization. He also feels that disintermediation is not a real phenomenon, rather we are choosing new mediators. He liked the concept of leveraging the small efforts of many, including those of strangers. He said that a development of social capital is critical and that "Balkanization" is not likely since we are no longer prisoners of geography: we are likely to link to others on the net like ourselves. Metcalfe also reiterated the importance of the periphery; he reminded us that today we have constant surprises about what is on the edge.

In summary, Metcalfe said that the tools are undergoing rapid change; the communities are new and big; the impact on business regards advertising, choosing the new, and the use of cybercash; and politically there is "danger of increased participation." Can we predict the future? Think about how hard it would be to explain frequent flier miles to Orville Wright, he admonished. At any rate, Bob Metcalfe predicts that the future is bright!

4.   The Panels
4.1   Tools and Technologies

Mark Ackerman, University of California at Irvine; Tim Finin, University of Maryland Baltimore County; Paul Resnick, AT&T Labs; and Michael B. Spring, University of Pittsburgh

We were reminded about the paradigm shift: today we look to "agents" whereas 5 years ago it was "objects" and before that "expert systems." Agents figured directly or indirectly in all of the panelists' talks: agents are adaptable and cooperative, they offer opportunities for cooperation among distributed,

autonomous systems, and they can route questions to other systems and then, if need be, to human experts. Data mining, visualization of data streams, and automated evaluation of materials (perhaps using correlation between time spent reading and what the user liked) are current focuses.

Perhaps more interesting than the answers were the questions brought up by the panelists. For example: "What is your workstation doing for you today?" "Is it your workstation or anybody's workstation?" "If your workstation can't do something, does it find out how to do it?" Another panelist asked: "What creates groups?" "What maintains groups?" and "How do groups disband?" He also wondered whether you can enhance the weak ties of collaboration through the use of cyberspace. Finally, we were asked: "Are we going to have universal standards for communications?" and "Do we only want to leverage the efforts of people we know?"

The discussion following the presentations was animated and included comments about the need to define agents by the boundary of their expertise since there will be no graceful way for them to fall off the edge. As for an ontology, will we have machine readable information on each person defining his/her area of expertise? Also, what about trust and privacy and security? Are we looking for the butler or the manager? A final comment suggested that we need to move toward predictive caching: improving access by predicting what is going to be asked for.

4.2 Communities of Learners

Donna Harman, NIST; Mark Miller, Apple Computer; Mitchel Resnick, MIT's Media Laboratory; and Steve Whitehead, Auto-FAQ Developer, GTE Laboratories Incorporated

M. Resnick introduced this panel with the image "Internet as Rorschach." He justified the image with comments about the Internet providing new ways to deliver information, new ways to access information, new types of communities, a new medium for construction, and a new metaphor for viewing the world. The panelists then presented examples showing how virtual communities have or are being developed based on similar research interests and the need for information or other help. One of the concerns presented was that today the user doesn't know who else is out there, almost a "twilight zone effect." This was related to the image of the "wild west" with issues of safety risks, junk mail, and commercial scams. Another concern expressed was: If we design communities, will the users come? The panelists all confirmed the value of the

"cyberworld." Suddenly the user can communicate with a huge universe of people interested in his/her topic. Thus, there seems little doubt that virtual communities will succeed.

4.3 Implications for Business Strategies

John Gage, Director of Science Office, Sun Microsystems; Fred Kittler, Velocity Capital Management; Bob Spinrad, Xerox PARC; and Mark Weiser, Xerox PARC

The panelists all agreed that the Internet is changing everything so fundamentally that the basic rules of marketing need to be changed. The theme was the ubiquity of computing: we are looking at an international bazaar that is indifferent to geography. The issue of the price of bandwidth was mentioned and it was suggested that if the price is too high, maybe we just need to make better use of it. Pragmatism ruled this session even as scenarios that seemed far in the future were presented. For example, consider the Internet as having five billion channels, roughly one channel per person. The notion that the "winner takes all" where the best will win in the global economy was presented in this session. In his closing remarks, Metcalfe questioned the possibility of "winner take all" happening because of the distributed nature of the electronic environment.

4.4 Political Implications

Bob Axelrod, University of Michigan; Mark Bonchek, Harvard University and MIT AI Lab; David Brown, New School for Social Research and author of "When Strangers Cooperate"; Robert Putnam, Harvard University; and Barry Wellman, University of Toronto

Putnam challenged the panel members to focus on how the global society will be different because of the use of the Internet. The panelists speculated on the potential effects of the increased dependence on cyberspace. A negative aspect is that there could be polarization of American society until universal access is achieved. On the positive side, interactive Internet activities are substituting for passive television viewing and perhaps even for the interactive, but solo, electronic games. These opportunities for interaction with a broad based virtual community are also likely substituting for the community organizations that have been in decline over the past decades.

Some of the images conjured up by the panelists included: a web versus a cocoon, a movement towards staying indoors, not meeting strangers on the corner, and moving work from the fishbowl to the switchboard. We say things are not what they used to be, but we must

ask if they ever were. Also, is a virtual community really a community? As one of the panelists pointed out, a little "face time" goes a long way; now we need to find out how much face time is necessary to maintain relationships, whether social or economic, or to maintain the trust needed for cooperative work.

4.5 The Future: Where Is This Going?

Nick Arnett, Verity; Stewart Brand, Global Business Network; John Markoff, New York Times; and Paul Saffo, Director at the Institute for the Future

It was suggested that one of the earlier concerns of the "twilight zone effect" would be resolved. The web is all stuff but online is all people. Virtual communities are being developed and people are communicating. As one of the panelists said: It's like a gold rush without much gold. However, as we design the components that make up the cyberspace, users will identify the bits of gold allowing, as a panelist commented, us to finish the rush and creep up on the gold. There are benefits as we develop the system: we do lateral linking and we're teaching kids to get used to bugs and do work arounds. This is good because work arounds are pervasive in all of life, and they even make life more robust. As we move to virtual communities, the change should not be perceived as a rug being jerked from under us; rather it is the flying carpet that we are riding.

The panelists offered additional comments. For example, parents, teachers, and others could lead reform if they would talk together. Perhaps a virtual community could be developed to lead this reform. Others say that the Internet won't be effective until it is pretty; however, do we need extensive multimedia? Such idealism could slow down the development of the Internet. Another of the panelists pointed out that search capability is only useful if you know what you're looking for; serendipity is not randomness but being surprised by things they find along the way. Finally, we were reminded that if we are to base our predictions on the past, we would see that a new media arises about every 10 years: in the 1980s it was microprocessors, the 1990s cheap lasers giving access, and the 2000s will be shaped by cheap sensors with eyes and ears. As we work and talk about the possibilities of the Internet, we need to keep in mind this rather lighthearted view of the future: It's happening, happening everywhere, an awesome new tool, better than real life, replacing real life, swallowing the whole economy, self-organizing, alive, smarter, and worthy of worship. There is no doubt that the Internet is big today, but it is not mature! On a more somber note we were asked: If we make it smart, is it going to be loyal?

4.6 Reviewer's Commentary

The Leveraging Cyberspace Conference was a refreshing forum where ideas and images of future use of the Internet were freely expressed. There was no attempt at setting an agenda or resolving problems; the goal was to discuss possibilities. As an opportunity for interaction with creative thinkers, the conference was excellent. How much comes out of the interaction remains to be seen.

5. For More Information

There is no Conference Proceedings. Information and some of the papers presented are available on the Web at <nii.nist.gov/cyber/cyber_conf.html>. Links to papers by panelists participating in this conference, found on the above Web site, are as follows:

Ackerman, Mark: Expertise Networks as an Enabling Technology for Cyberspace Use

Arnett, Nick: Massively Parallel Wetware: The Internet as an Agent of Creative Collision

Axelrod, Robert: Political Effects of the Information Age

Bonchek, Mark S.: From Broadcast to Netcast: The Internet and the Flow of Political Information

Kalil, Thomas A.: Leveraging Cyberspace

Putnam, Robert D.: The Strange Disappearance of Civic America

Resnick, Mitchel: Distributed Constructionism

Spring, Michael B.: Multi-level Navigation of a Document Space

Wellman, Barry and Milena Gulia: Net Surfers Don't Ride Alone: Virtual Communities as Communities

Whitehead, Steve D.: Auto-FAQ: An Experiment in Cyberspace Leveraging