

## The Internet as Public Space: a Framework for Sociotechnical Research

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What I'd like to do is to share with you -- after taking copious notes over the past few days -- is a combination of some prepared slides and pieces of thoughts presented in a way that I hope will add an additional framework to your thinking. First, a few words about my background. I am with the National Science Foundation (NSF) where for many years I have been an officer with day-to-day management responsibilities in the areas of information and intelligent systems. But before that, my previous professional life is teaching and research, on the engineering faculty of the University of Connecticut for 14 or 15 years. Last year, I had a very unusual assignment away from NSF. For 18 months I was a Senior Research Fellow at Harvard University's John F. Kennedy School of Government where I took advantage of the time away from day-to-day management to study issues at the intersection of technology, particularly information technology, and public policy. Last week was my transition period for coming back to NSF. So this is my first official assignment back as an officer of the NSF: to be here and talk to you about what I have learned last year. Fortunately having had the benefit of hearing many speakers -- and the discussions from the audience -- there have been a large number of issues covering a wide range of topics that have helped reinforce my thinking in a range of ways.

Before we get into some of the slides, I want to come back to John Evans' three key building blocks of the information age by way of commentary. He mentioned three things. *Technology* is one, *content* is second, and *distribution* is the third. Ben Shneiderman later proposed to add a fourth component, a fourth building block. He added *people, people, people*. I think it is a very important addition to this collection of building blocks. Clearly the three building blocks that John Evans referred to have *people* implicitly in mind. People are obviously the source and the creators of technology.

People are also the beneficiaries, the recipients of technology's benefits. People are the ones who create or produce the information or content, and are, increasingly, the consumers of information. In addition to being the originating source, people are also the destination of distribution in the Internet environment. And, people are responsible for everything in between, as intermediaries or actors in other forms of mediation. But it is also very important, as Shneiderman pointed out, that we bring the notion of the human dimension to the fore and make it an explicit building block for the information society. I think this has permeated the entire discussion in various sessions and has been brought out by many speakers throughout the Summit. It is indeed, I feel the pervasive element of the Summit: focusing on how the human dimension plays a role in the sociotechnical research agenda.

Another reason that I think it is very important to have this fourth component, as several speakers have also brought up, is the fact that the human dimension actually produces a measurable function for the new economy of scale. Several speakers pointed out that scaling the human participation in terms of users, consumers, students in colleges and universities, and schools, is probably one of the most difficult challenges facing us in sociotechnical research. In the Internet environment, the masses of users have become a measurable entity that can actually be a cost as well as an asset. In traditional economics, people are a burden to many of our endeavors. Every time the scale of things increases, adding more people to the system is always adding more costs. Until -- all of a sudden - we have the Internet. Here the users, the customers, the masses of people become an asset! My favorite story that tells of this transition is the example of many of our businesses capitalizing on and harnessing this particular element. Take Federal Express as an example. FedEx has been able to integrate their

customers into part of their operation. As you know, everyone who asks FedEx to send a package to his/her destination, and there are millions of these deliveries every day, is anxious to find out how and when the package is delivered to its destination. How to track this at the customer's request is an important part of Federal Express's operation. Well, they don't have to do that anymore. You are the ones who have to do this at your own cost. You log on the Internet; you become the clerk for them. The customer's computer has become a sort of micro-post office to find out information and provide the clerical function for the business. And Federal Express was able to use this scaling activity by bringing the masses of people, their customers, into their operational function, to improve their efficiency.

So in a way this human dimension - the addition of the fourth component - brings a very pressing need for us to take a look at what are the right kinds of sociotechnical behaviors that would add to our future research agenda.

During the course of this Summit various discussions have brought out many different interesting research issues. There is a rich collection of items, topics, and concerns that I will take back as a way of looking at what we need to do within the Federal Government and how we should go about doing this in collaboration with the public we serve, the private sector, industry, academic communities, and so on. In order to provide an abstract model and perhaps some kind of framework in which to pursue this activity, I want to share a few thoughts with you about how we look at the Internet in a sociological dimension. I chose this title "The Internet as Public Space," as a starting point for my discussion. It's chosen to contrast the Internet being looked at as one of the conventional media types, such as broadcast, publishing or distribution and the like.

Public space in the physical sense, of course, is a very familiar concept to us. The Central Park in New York City, the shopping malls in the suburban areas where we live, and the University of Michigan Media Union are some examples. What characterizes physical public space includes at least two concepts that we can borrow in discussing virtual space. One of course is that it is a place where many of us share resources, obtain access to different kinds of resources and information. Also it's a place where we engage in a variety of social interactions. Secondly, and in return for this privilege, we, as participants in this space, are

obliged to abide by certain rules or constraints that govern the functioning of the space. For example, when you walk into the Media Union it says on the door that it's opened 24 hours a day. Of course you want to enjoy this privilege of 24 hours a day. But students also find that there is a sign posted on the door that says, "This section is closed for the Internet2 Summit." So there are constraints in these public spaces that we live in. What we do as citizens of the space is to negotiate the terms and conditions of how we use the space. I think we can borrow these concepts in the digital arena, the virtual space, as well. The constraints, the access, the rules, and so on apply. In addition we have perhaps a number of other more special if not unique characteristics of public space in the information era. Here I want to enumerate a few and perhaps say a few words about each.

All of these somewhat unique characteristics tend to blend dichotomous or multiple concepts into one. I want to use the word *simultaneity* as opposed to dichotomy or multiple concepts. The first characteristic is the *public vs. private* concept. That is, the Internet, as a public space, tends to have the feature of simultaneously serving public and personal needs. The Internet, with its networking reach, connects people, machines, and a variety of information sources, and, as a consequence, it is at once public and private. Everyone works, lives, enjoys in the same space, and shares the resources with the rest of the community. And yet, every one of us actually can carve out a particular part of the space and claim that it is something that we own ourselves. From the net we draw in, share resources, and then tailor all these resources for our personal use. And conversely, we, as many of us do in this Summit and elsewhere, put our personal information, like our web sites, out for public consumption. So in that sense, we share that concept of simultaneity of both public and private. I think someone, I believe it's Carrie Heeter, when she was moderating her session, said something that captured the spirit of what I wanted to say about this concept. She said that every time that you log on to your computer feel that you are all by yourself. Yet you are also aware that there are 60 million other Americans that are doing the same thing in the Internet space that we all share. That scenario nicely captures the notion that public and private simultaneously resides in the Internet framework.

The second unique notion is that the Internet is both global and local. By definition, the Internet

is globally interconnected. And yet the concept of *localness* actually will help create the richness, creativity, and the usefulness the Internet would provide for the community. In a way, localness can touch on a variety of things such as content, history, culture, languages, and the kinds of things that concern local neighborhoods, communities, interactions-- all of these things it would create for the global community.

Similarly, we have illustrations of the issue of *control* versus *freedom*. That's another characteristic of two contrasting notions that simultaneously dictate the way that we want the Internet to be. Of course the issue of control and freedom has been debated for a long time -- way before the Internet era, particularly in terms of each of the media types that we're all familiar with. But the digital nature of the Internet content makes it much harder for the public to reach any kind of consensus. How much control do we want while we pursue and enjoy freedom? In general the public wants unlimited access to information without the interference of say, for example, Government or the interference of business interests. And yet at the same time we all want, the public all wants, to have a very secure, controlled, protected electronic environment. So this debate will continue. There have been many books written about this debate. One of these is a recent book by Andrew Shapiro, I believe it's published early this year. The title is *The Control Revolution: How the Internet is Putting Individuals in Charge and Changing the World We Know* [7]. This book depicts the shift of control from the historic and traditional arenas of organizations and Government and so on to the arenas of individual people. Again, bringing the concept of the human dimension back to our discussion.

Many of us at this Summit talked about the various societal uses and the kinds of issues deriving from the challenges that face us when we try to apply technology to our societal needs. And there are many of those. And obviously I'm not going to elaborate -- because most of them have been discussed here at length, from e-commerce to digital libraries or from distance education to the health care issues and so on. All these applications demand that we look at the human dimension. That is, to bring the fourth component of the building blocks to bear. Clearly digital libraries, as mentioned by many of you here, are the way; the new way that information and knowledge are going to be created, distributed, packaged, and used by

people. But the more comprehensive vision of all of this includes the large masses of users. It's not just used by schools, it's not just used by the scientific community, and it's not just used by the Congressional staff, which is the case in the Library of Congress in Washington, DC. I think our vision is that every schoolchild and every household will be able to have a piece of the Library of Congress in the future, for whatever projects they want to use it for. And, in fact, owning *different* pieces of the Library of Congress at *different* times for a *variety* of projects that they are interested in pursuing.

For education, we are challenged to go beyond what we consider to be distance learning. It is the human dimension that allows us to reap the benefits of the new economy of scale that should transcend time, geography, culture, language, national borders, and indeed also age. It will be an environment in which we can learn; educate ourselves for our entire life span.

In terms of health care delivery, the technologies that would make that happen are critically important. Many of those issues and opportunities have been discussed. Teleimmersion, remote access, teleconferencing, all of these will contribute towards the way that future will be delivered. But beyond that, I think that the Internet will forever change the relationship between the physician and the patient because of the fact that the computer technology, the communication networks, and the information resources are going to be much, much more readily available to all of us. Again, the human dimension is a major consideration in the usage of these health-related applications.

What are some of the Internet barriers and challenges that might effect the widespread application of this technology? I think some of you have, in fact, including my colleague at the NSF, Nora Sabelli, have already mentioned one of the most critical concerns is the way that the Internet is dividing the population, the so called digital divide. I think we, particularly this audience, know that it is a critical issue. Perhaps you have come across some of the recent reports that have come out. The Department of Commerce has issued a series of reports over the last several years. The most recent of these was published in July [9]. While the overall percentage of Americans with access to computers and Internet has been steadily growing, the *digital divide* breaks along the lines of economic, racial, educational, geographical, rural vs. urban residence, and physical abilities. The digital divide persists -- and in many cases

it's getting worse. The United Nations Human Development Program painted a similar picture across national borders in the international scene [8]. I think this is one of the critical issues that the sociotechnical research agenda must address.

Another important issue which was discussed here in different forms is about how we best train the next generation as well as how to educate ourselves in the digital era? How do we create a society of citizens to become digitally literate? Digital literacy is a term coined by Paul Gilster [5]. The traditional concept of literacy, of course, refers to the ability to read and perhaps to write. But in the digital era, we're talking about really mastering a set of additional core competencies beyond simply the skills of reading and writing. We mentioned how we go about doing an on-line search, demonstrating our ability to be able to find information. Beyond this is the ability to make judgments about the material that we find on-line once the search is completed. Because the material that we get from an on-line search is largely unfiltered and pretty much biased, no matter where we get this information, in most cases the information we receive is incomplete. There have been studies that show that only 20% or 30% of the entire web site repository was collected, categorized, and indexed for use.

In conclusion, I want to leave you with a few thoughts on the focus of this Summit, namely, what are some of the public policy implications of this technology? And, again, I want to go back to John Evans' point earlier. He, being a leader and a supporter of this Summit, asked the question yesterday about the Government's role in terms of promoting and implementing advanced networking technology? Partly in response, I think that in many ways we know that government at different levels ought to be a catalyst to provide the digital information resources. In addition, many government agencies, including the National Science Foundation, have the responsibility of funding new kinds of research that are unique to this advanced information technology. Research that will address, for example, the governance issues of the Internet use. These range from security, reliability, data protection, and so on. How do we create and use the social capital vested in organizational structures such as networks, formal trusts and collaborations that facilitate positive human development and economic growth? Such support for new research needs to cover a variety of aspects of social wellbeing, an interest of many social scientists as well as information

technologists. They need to seriously look at the behavior and implications of Internet technology on individual and organization functioning.

My final thoughts are along the lines of a personal reflection. As a member of the federal government I recognize the importance of understanding that in order to collectively accomplish what we want to accomplish we have to somehow join forces with the private sector, including industry and, as this conference environment has underlined, with philanthropic organizations such as foundations. In this country, there are thousands of these organizations whose mission is to promote social advances, community development, and support research and education in our higher learning institutions. We need to work together and leverage our resources to achieve this new economy of scale when applying these technologies to our society in a lasting and meaningful way. This Summit is a first step towards that collaboration.

*The views expressed herein are the author's and not those of the National Science Foundation.*

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