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Introduction to Technology-Mediated Social Participation

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BEN SHNEIDERMAN, COMPUTER SCIENCE PROFESSOR, UNIVERSITY OF MARYLAND: I'm Ben Shneiderman, Professor of Computer Science at the University of Maryland. I'm working on social media. I'm proud that I'm a member of the National Academy of Engineering which highlights the importance of human computer interaction and usability.

My goal is not to tell you about my own work but to set the table and tell you about what we'll be doing. Jenny has really been a leader in this area for a long time, for more than 15 years. Her book in the year 2000 was called *Online Communities*, the first major research book that described this area. Very influential and has had a profound impact on many people working in this area. That was an important thing.

My background is in physics, as Pat O'Shea said. I became a computer scientist and I'm happy that way. I call myself 20 percent experimental psychologist in having for the last 30 years promoting the idea of human-computer interaction, founding the HCI Conference in Gaithersburg in 1982, and having written the book *Designing the User Interface*, first in '85, '86 and now in its fifth edition with Catherine Plaisant, my colleague here, who will be joining us later today.

My topic has been this HCI and more recently Info Viz and now I'd like to say I'm 5 percent of a sociologist. Would you grant me that, Mark?

UNIDENTIFIED MALE: Six and a half.

SCHNEIDERMAN: Getting that.

UNIDENTIFIED MALE: I mean seven.

SCHNEIDERMAN: Seven, all right.

(LAUGHTER)

SCHNEIDERMAN: As you can see we put ourselves out there. Please do follow us if you want to hear our stories. We do think these conferences are an interesting event. Part of the conference monitor tool measure the success of the conference by the increased number of followers as well as by retweets and so on. We're trying to encourage you to retweet the tweets that you see and we want to reach out beyond this room so that other people will know.

All the videos of the presentations will wind up on the web. This year since we got the support from NSF, we will be doing full-text transcriptions and if we get to it, closed captioning for deaf participants. That's important to us and that's our story at the University of Maryland.

We're both pleased to represent the Human Computer Interaction Lab which this year celebrates its

30th anniversary. It's the longest standing research lab in that group. I was the founding direction but then Ben Bederson, Allison Druin and now Jennifer Golbeck are the directors. Jen will be here as well, today, and she'll be speaking later in this week.

This is an interdisciplinary community at Maryland. Our Computer Science and the I School are both the supporting partners, but there are many others. We've already mentioned the MITH, Maryland Institute of Technology and the Humanities. For me, one of the great fun things is the interdisciplinary of it. I was raised in the age of Marshall McLeon (ph). He liberated me from the narrow specialist view and said that it was OK to be a generalist. I'm dangerously eclectic and find myself into new disciplines periodically which is great fun for me. I like being a dilatant, I like being a graduate student at every age that I can be, and learning something new and making a contribution. I claim I'm the best generalist. I bring across ideas, across disciplines and the strategies that we've developed are useful there. That's important to me.

I loved hearing your introductions and the different disciplines. I've done a little homework so I know a little about the disciplinary spread here but by a show of hands, and take a look around, how many of you consider yourselves primarily I school information oriented? You can raise your hand more than once. High. Raise your hands high.

That was the largest group that I saw in the registration.

How many computer science?

That was a smaller group. OK.

Communications?

Turns out to be a large group. Look around. We have a very strong devotion of communications.

Again, you can raise your hand more than once.

Library?

We had some library.

(LAUGHTER)

The library and information systems. OK. They're shying away.

Now we have one anthropologist here. There she is. We also have English here. Those are really interesting. English, part of the MITH. We've had one good history with MITH, the wonderfully titled Maryland Institute for Technology and Humanities. Moving forward, expanding and building up in good ways.

Of the 54 of you who are officially registered here, there are six or eight other people from the Maryland campus who have joined and are hanging out. The official registrants were in that group.

(OFF CAMERA REMARKS)

I think the interdisciplinary representation is really important, both for the clusters as well as the outliers. Speak up if you're an anthropologist, writing studies or English, and you have a different point of view. We do want to hear those points of view. Remember, the strong and weak ties all work. You know all that.

[New Slide: HCI Pride: Serving 5B Users]

We start from the HCI pride, 30 years of history. Those five billion users of mobile devices are due not just to Moore's Law, but we did some of that, too, and we want the credit, the visibility. There is a growing awareness of the role of user interface. This week our colleague Ben Bederson is busy testifying in critical international cases involving the rights and uses of the mobile technologies. The people in this room and their advisors helped make all the difference in supporting a diverse set of users, a diverse set of applications, and a wide variety of powerful interfaces that are truly changing the way we live, work, and play.

[New Slide: Goal: Next 50 Years]

Next 50 years. Where are we going and why are we here? Why do we spend our time on this? Why we think it's so important to get you together? We know that while some of you are well accepted and beloved in the disciplines you're in, some of you are also struggling and facing challenges that the work you're doing is kind of weird, different, not mainstream, not core. We're here to help make you core and make you get beyond that and make you become the leaders, or among the leaders.

We've read the newspapers, the books, and so on. Apparently 41 percent, my Kindle tells me, through Barry Wellman and Lee Rainie. They're both people, you've heard their names. Lee Rainie will be speaking downtown on Thursday. Their book called *Networked* tells the story in a very powerful way. I was charmed as I read through the book to see the names of people from this conference like Nancy Baym, like Sari Deyardi (ph), our former students, they're mentioned throughout this book in terms of contributing to that area.

We do believe there's good deeds to be done. We're very oriented toward pro-social activities. That's a history of the HCIL.

[New Slide: Challenges]

We're aware of the challenges. This is not naturally going to turn out well. There are lots of reasons, and Pat O'Shea referred to this, that this could go bad. If we're not careful, if we don't work hard, if we don't devote ourselves to the pro-social positive outcomes, there's a real chance that malicious forces can compromise these technologies and that we will be embarrassed by the technology that we have built.

I think we more than ever in this discipline face the challenges that the physicists of the 1940s faced, which was they created an amazing, powerful technology which they hoped would bring world peace and benefits in many ways, energy too cheap to meter and many, many positive things. But it also brought many challenges and dangers. We are in that situation and do think -- I mean quite seriously -- to commit you in parts to the policy, to the technology. Write your great papers but also keep a fraction of your attention to the policy-related issues and think about how we are going to make this turn out to

be a happy story so that you can tell your grandchildren that what you did during the social media revolution. You want to be proud of that.

[New Slide: Early Steps]

We've been thinking about this for 15 years. I became more entranced with that and we began in 2009. We had a meeting here, 25 people. I don't think any of the people here attended that one but some of our speakers did. They paid their own way to come here. We sat and worked and wrote a 50 page whitepaper that's still out there that tries to charter this notion and say this is really important, pay attention, something is happening.

I wrote a letter that appeared in AAAS asking for a national initiative in social participation saying this is something to pay attention, this should become a NASA level, a NIH level attention issue because it's important.

[New Slide: NSF Workshops: Academics, Industry, Gov't]

Jenny and I went to get NSF funding with our colleague Peter Pirolli from Park (ph) and did run to workshops; one on the west coast and one on the east coast to bring together 30 people in each location that represented industry, government, academia and we wrote seven papers, which appeared in this special issue of *IEEE Computer* 2010.

[New Slide: Cyberinfrastructure for Social Action on National Priorities]

It laid out the territory for these things.

David is smiling. You're familiar?

UNIDENTIFIED MALE: Of course.

SCHNEIDERMAN: We believe this was influential. We published in the *IEEE Computer* because we did want to reach the technology people. They gave us a fast route to publication and so although this was held in early 2010, we were in print by November and reached a large audience.

Do we have impact? I would say the story is a mixed story. We're not yet there. The people in this room, the colleagues we talk to all believe this is a really important topic but not everyone does. As you know, vested interest and existing technologies and disciplines will work to suppress the growths of new disciplines. We do have to be active and make that battle.

[New Slide: President's Council of Advisors on Science & Technology: Dec 2010]

The good news is the December 2010 report from the President's Council of Advisors on Science and Technology -- this is the way Washington works, by reports. Boring, great covered reports which are written by very interesting, powerful people, included Eric Schmitt of Google and Craig Mundie of Microsoft and many other really interesting, powerful, thoughtful people.

We felt we were getting our message across.

"Invested in the 'science' of social networking, crowdsourcing, and other emerging paradigms that exploit extreme-scale usage, scalable systems .."

So this is what they were supporting. Notice how their tie-in between the social science and the opening of the sentence and then the high-tech aspect. We think that's the formula that we've described in many cases. There's three things you've got to do if you're going to make an impact.

One, claim national priorities. That's why we try to focus, and I was so pleased that your descriptions demonstrated your interest and devotion to issues of substance, importance, national priorities in many countries and things that are positive in terms of people's social lives.

We are quite convinced that Google and Facebook and Twitter and Yahoo will do an excellent job in studying discretionary use and playful things and entertainment and ecommerce and that is fine. We want to invigorate the public sector to address the national priorities to make sure that they get addressed.

In that report -- I have used this a lot, "Creating a science of social computing." When I show that to my colleagues, they say, wow, that's something new.

"Scientists and technologists don't yet know how to take the lessons of one success or failure and apply it to another problem."

That's what we're after. National priorities, deep science, and extreme technologies. We've got to put all three of them together. As you think about your projects, we want you to think not just about the national priorities or the deep science, but what are the technologies that make it happen? We want you to think about the implications for design. We want to know what your advice is, in terms of the technologies that are still needed.

In the social sciences sometimes the researches assume the technology is fixed or given and then we study the usage. But, no, this technology is fluid, dynamic and changing, and our goal is to shape the future of technology, not just to study its current status. That's a really important distinction.

I know some of you in sociology -- Alan (ph) and I have talked about this too -- the goal often stated is to understand the usage the social impact of these technologies. But we want to do more than understand. We want to change it. We are here with I hope a shared purpose to look and see how we can understand it so that we know enough about the theory that will give us predictive power and prescriptive elegance to be able to guide the future generation of designers.

[New Slide: International Efforts]

We're not alone in this. There are international efforts in many places. I think you'll find most compatible with us, the European Society of Socially Embedded Technologies. Their manifesto is quite close to the papers we had written in 2009. European Commission on Joint Research Center has two very powerful reports about the impact of social media on European economies. The Chinese Academy of Sciences has put 200 researchers to work on the idea of social media study.

You may know of other efforts, as well, and we can talk about that.

[New Slide: UN Millennium Development Goals]

Elevating even further, I use this slide in almost every one of my talks in computer science and elsewhere. Our requirements definition for our work should come from things like this -- the UN Millennium Development Goals set out in the year 2000 by the nations of the UN to end poverty and hunger, promote universal education, gender equality, child health, maternal health, combat HIV/AIDS, environment sustainability, global partnership.

The reports from the year 2000 is not terribly encouraging. While there are some successes in certain countries, the progress by the metrics established by the UN show not the kind of progress we'd like to see. Currently the UN is formulating groups that for 2015, will produce a new set of goals for the year 2030. Based on this experience of these 15 years seek to develop more refined goals and more effective techniques for achieving those goals.

I would like to be part of a discipline, a community who sees this as part of their agenda. I know, and you should devote yourself to your research project doing great research, publishing important papers. But somewhere keep in mind, I hope your influence will come from noble and global aspirations and inspirations.

[New Slide: Social Participation: Webshop Goals]

Here is what we saw as the goals for this conference. I sent this out in email so most of you may have gotten it. We want to clarify what national priorities we can address, which ones we really care about, where we can have the greatest impact. We do believe there's deep science questions here to understand.

Last week I attended Aspen Institute's talk by Lisa Randall, the Harvard physicist superstar and she was poetic about the Higgs Boson and how it was so important and amazing and terrific and fantastic and wonderful. I would say it's equally important to understand the trigger for human participation. The Higgs Boson generates mass, we generate participation.

What is the Higgs Boson of human collaboration, of human participation, of social cooperation? How do we understand that?

This is already a quest well established in sociology and other disciplines but it's a totally new game in the world of social media. For the first time in history, much of what we do is online. For the first time in history, we have the tools that will enable us to understand, to take the pulse of culture as it is going. That's what's really different.

Taking social science down the road of big data, quantified analysis and statistical tools is not easy. Not everyone thinks it's the right way. Mixed methods are really important. We'll be getting that throughout the talks. We've encouraged the speakers to focus on their research methods, to highlight what tools and techniques they're using because we think that's going to shape the success of this discipline.

The research methods are new and we do think the old era of controlled experimental science, which even propagates into social sciences, still has a lot to offer. But the idea of what we call interventions, where you're working at scale on real systems and making a change. Sometimes this is called A/B

testing, a term that originally came from Amazon and Ron Kohavi from Microsoft and Google picked up.

If Amazon wants to know about selling books well, they could make pictures of the books bigger or they could add more text about the books. They could make that experiment and have 10,000 users try one version and 10,000 users try another. In a couple of weeks, if you run Kohavi's methods, you get a pretty good answer. That answer may change if those weeks happen to be during the winter holidays, it may not be representative, etc., but pretty well you get a lot of interesting data and you rapidly change the design of the interface and you can make these changes and many, many such evaluations.

Amazon had a very small usability testing effort but had a very large, online institute interventions. Now Ron Kohavi in his writings about this does call them experiments but I don't think they're experiments in the sense of being controlled in the usual way. I think of them as interventions. I want a different word because to me, experiments suggests the laboratory study that's in a controlled environment and when I talk about an intervention, I mean an existing real-world system that we are actually changing.

Not all of you have access to such large scale systems and university groups like the Minnesota MovieLens effort. It was designed to create an environment for such testing. Increasingly companies may understand that they may benefit by partnering with universities and allowing those collaboration.

The extreme technology challenges: security, privacy, scalability, all those issues. I've got my trust empathy responsibility and privacy Terps for those who follow that. But trust, empathy, privacy and responsibility are my -- I also suggest that the language will have to change. While the Moore's Law people have successfully promoted for 40 years, the idea that we should measure progress by the gigahertz and the megabytes and the tera whatever. I think we need to change the language because for us, the success stories will be if we measure the giga contribs and mega collabs and tera thank yous.

You may have a better measure but let's start by shifting the language and in the world of technology, I often say that we have a history of saying you are what you eat but in technology you become what you measure. If we think that tera thank yous are what we want and mega contribs, that's what we got to measure.

Wikipedia is about 100 mega contribs. Contribs are the word that Wikipedia uses to measure an individual contribution. They don't have a measure of collabs, remember collaboration. But I can tell you that the amount of text on it Wikipedia discussion pages is larger than the amount of text in Wikipedia. So there are collaborations and discussions going on by a much smaller group. That's what I think we need to understand.

We want to influence national policy. That's still a struggle. We'll talk more about it. And increase educational opportunities, something we can do. Here's our way of increasing educational opportunity. We hope many of you will go back to your campuses and ask your faculty to say, why is there no course on social media? And we don't just want a seminar course at the graduate level for six students, we want a required undergraduate course for 600 students. That's what we see as needing to happen.

Some of the faculty in this room, session and week are leaders in teaching social media at the graduate and undergraduate level in creating the audiences and making this topic a significant one.

Another role for universities is the outreach to work with the industries and help educate them and give them access to the opportunities that universities do provide.

[New Slide: 911.gov: Internet & mobile devices]

For a few minutes in my remaining time I want to say a few of the things that have happened that we think give us the kind of indication of promise that this may actually turn out to be a good thing.

Jenny and I, we usually don't write together. We help each other. She is one of the team that wrote the book called *Interaction Design* with Jenny and Yvonne Rogers and Helen Sharp is the other leading book in the field that is used for human computer interaction and that's been a really influential role as well.

We help each other but generally we haven't worked together. If you don't know, we are married so that's another story.

(LAUGHTER)

We did work together to write a one page paper. That we could go.

(LAUGHTER)

And it called for -- the title was 911.gov and it came from my fumbling around with my browser, typing in 9-1-1 and getting nothing useful. It struck me that the internet could be used as a mechanism in disaster response. We had three arguments there. That residents could report information with their mobile device. You fall to the ground, you press 9 and it sends your location, time stamp to a centralized control center that might accumulate hundreds or thousands of these and it would create a rapid, easy way to collect data.

Professionals could disseminate instructions on a block by block basis to stay in place or evacuate or there will be buses in this shopping center at 4:00 to help evacuate you from the city.

The tougher one was resident to resident assistance. Could you envision that you would agree to take Mr. Jones in his wheelchair in apartment 301 with you when you evacuate the city? That's a big commitment to make. But we were inspired by the tragedy of the summer of 2003, when in France 15,000 older adults died in a heat wave because no one brought them a bottle of water or took them to an air conditioned place. Similarly, in Chicago that summer 1,100 elders died.

It's a one page paper but it produced the largest response of ever paper I've ever written. Within hours of the embargo lifting, it was on the BBC, the Discovery Channel, Newsweek and it was all over the world, produced a great trigger of excitement that I hope pushed ahead interest.

That date, February 16, brings chills to my back still when I think about it. Some of you may know the date April 16, 2007. Does that have significance for anyone here? That's interesting. That's the date of the shootings at Virginia Tech. That tragic event, the shooter killed two people at the periphery of campus at 7:45 in the morning. Then came to the center of campus and the other 30 deaths were at 9:15 in the morning. There was an hour and a half and many people wondered had there been an alerting system on SMS or another mechanism, would the day have turned out differently?

Most universities, Maryland as well, you register for it and every Wednesday at 11:55am I get a test message. It's been used a dozen times in the years when there has been a police incident, flood, fire.

Last year we had an earthquake. We also had a hurricane. It shows we can overcome all those things.

[New Slide: Reporting: Earthquake & Storms]

This produced a strong response. There are many other disaster reporting mechanisms. The U.S. Geological Survey has a "did you feel it" web site to report earthquakes and local storm reporting.

[New Slide: Reporting: Local Incidents]

We've worked closely. Our NSF Sox (ph) grant was to study the Nation of Neighbors, a community safety group. That was founded by Art Johnson here in the Washington, D.C. area. It has become a national effort with 400 online groups already.

[New Slide: Disaster Response: Wildfires]

Disaster response for wildfires through Flickr.

[New Slide: Community Safety: Abducted Children]

The AMBER Alert. Eight million people have the icon on their desktop that is the AMBER Alert and agree to participate in this. Amber was a child who was abducted and this is in her memory. She was killed, sadly. But this group claims more than 500 abductions they helped solve and maybe thousands they prevented by raising awareness.

[New Slide: Healthcare & Wellness]

Patientslikeme is a brilliant idea of three young MIT grad students. Two of them are brothers. They had a third brother who died of Lou Gehrig's disease and they built this. It's not ongoing a number of years. Great success story in enabling patients to track their chronic disease and its treatment. This slide used to have Google Health on it but Google Health didn't make it.

Again, reminds us that even powerful, well-funded organizations do not necessarily succeed when they go to address health issues. We don't quite know how to do that. That's an important national priority.

[New Slide: Doctor-to-Doctor Networks]

There are doctor to doctor nets in the US and the UK.

[New Slide: Energy Sustainability]

This is the Department of Energy's Energy Star effort.

[New Slide: Serve.gov: Voluntary Service]

Voluntary service. The Obama administration has been quite effective in trying to go and make a more communal approach to having voluntary service and public commentary on regulatory issues. If you're the kind of policy wonk, you might want to look at the OSTP, the Office of Science and Technology Policy. Their blog site and really deep and fascinating. The staff of that organization posts important

issues. For example, the discussion of can the government run challenges. The 120 lengthy, thoughtful, deep responses to that just really brilliantly reflected the deliberation that can happen in these kind of environments.

[New Slide: Open Data.gov + Recovery.gov]

I had the pleasure to help in some of this. In Recovery.gov, Obama promised that you could track every dime that was spent and this web site helped make that a reality. I was pleased to help them make that go.

Data.gov, a mixed story of success. There's lots of data out there but the number of downloads is not as ambitious as you might like it to be.

[New Slide: Network Theories: Evolution Models]

The theory side, we believe there's a good foundation of theory in this area we hope this week you'll learn more about social network analysis. Mark and Alan (ph) this afternoon will give an introduction to social network analysis. There's a good (INAUDIBLE) science, math and CS related aspect here. The physicists started doing this early and some great computer scientists. The most distinguished is Jon Kleinberg at Cornell. I'm just amazed by the wonderful papers he's produced with my former colleague Christos Faloutsos, who is now at CMU and Juri Leskovec, a brilliant young student of Jon's, and has now gone to Stanford.

[New Slide: Social Science]

There's also deep science from social theories and you'll hear a bit more about these.

[New Slide: Network Theories: Stages of Participation]

The theories that began to focus on social media -- how does Wikipedia engage with their users? Do they go from readers to first time contributors to frequent contributors? That's the usual argument.

[New Slide: From Reader to Leader: Motivating Technology-Mediated Social Participation]

Jenny and I in the second paper we wrote together took 120 empirical citations of research and out of that we distilled this rough model. Jenny is saying it's not as clean as I like to present it. But from the half billion Wikipedia readers, 1/10th of one percent of those registered to contribute.

Is there a way we could make it 2/10 of one percent?

I attended the Wikimania Conference a few weeks ago here in Washington and they're concerned because the number of editors is flattening, maybe declining. The percentage of women participants is lower than they dare to believe. There was a big effort to change the game and address those issues. While Wikipedia has a rich, complex, interesting, sometimes brilliant set of motivational structures and is a great success story, it's still not clear what it would take to make it go even better.

Of the contributors, a small become collaborators and discuss by email what the next hundred articles should be about 19th century American musical composers and work this through and make it happen.

Those collaborations are really important and by now Wikipedia has a rich social structure and the policy manual is huge. I don't think anyone has ever read all of the policy manual materials but it's a complicating thing like NPOV, neutral point of view. It's one of the simple ones. There are many policies. I run afoul of them time to time when I do editing.

The small number of admins who are the leaders. I think the number is about 1,400 now. Those are the people who make the decisions, who deal with the vandalism, who make policy. On top there's a 23 person board of directors.

They've engineered and thought about and developed very interesting set of structures. It's not just like everybody does what they want, there is a well-organized framework under which they work.

[New Slide: Leaders Determine Success in Nation of Neighbors]

Our work, I will have to go through and come to an end in a couple of minutes. We've been working on Nation of Neighbors as our project and I guess one of the key things when I'm talking about leaders, that's our tool on top called (INAUDIBLE). Let's look at many of these 400 communities at once.

The key thing with PJ's result with Awalin Sopan is if you have more leaders, your community works. If you don't have leaders your community doesn't make it. It's a classic social-psychology result but we found it operated online, as well.

Thank you, PJ. Your paper is where?

UNIDENTIFIED MALE: I just presented yesterday at ASA. It's going out for the journal soon.

[New Slide: NodeXL: Network Overview for Discovery & Exploration in Excel]

SCHNEIDERMAN: You'll be hearing more about NodeXL later today and through the week. I hope some of you attended yesterday. Mark, myself, and a dozen others -- Bernie, too, have contributed to making NodeXL. 125,000 downloads of users. A lot for education. You've got the copy of the book. If you didn't get the book, you're entitled to one. For the students. I don't know if we have enough for the speakers.

NodeXL lets you inside Excel build a network and you can also download from Twitter, YouTube and Facebook.

[New Slide: #Healthcare Tweets]

That's what we've done, creating networks that we annotate and extract with Mark's guidance of the right social information.

[New Slide: Graphic]

Our colleague Scott Dempwolf, this is his PhD work. Part of that was use NodeXL and all this stuff on the right are the people in the Human Interaction Lab at Maryland, you'll see our names there, and their affiliations with other people at different campuses. These are all state of Maryland data. He had done state of Pennsylvania but we said, how about giving us a slide with Maryland data so we show that. That

shows you the collaborations across the state of Maryland, as shown by NSF grants and the coPi network.

[New Slide: Analyzing Social Media Networks with NodeXL]

There's the book you should have.

[New Slide: Social Media Research Foundation]

Social Media Research Foundation that Mark founded and leads continues to be the home where appreciative of Microsoft support for three years to help launch NodeXL but now we are a separate non-profit organization, which means we're struggling. So if you know anybody with \$500,000 for us or \$1 million, we need them.

[New Slide: Biotracker: Motivating Citizens to Contribute Data to Citizen Science Projects]

I guess I'm going to leave it at that. We decided we'd let the time go for the student discussion and Jenny is going to talk about her Biotracker work and the citizen science effort and biodiversity for the encyclopedia of life. I'll see if we find the time during the week to put that through.

END