Keynote Speech



Professor Ben Shneiderman University of Maryland Department of Computer Science



The Next 25 Years of HCI Research: Technology-Mediated Social Participation

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Twitter: @benbendc

Founding Director (1983-2000), Human-Computer Interaction Lab Professor, Department of Computer Science Member, Institute for Advanced Computer Studies









Interdisciplinary research community

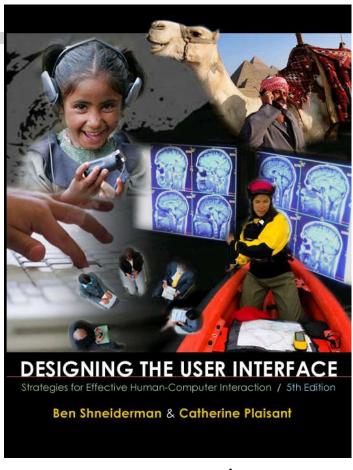
- Computer Science & Info Studies
 - Psych, Socio, Poli Sci & MITH

(www.cs.umd.edu/hcil)



Design Issues

- Input devices & strategies
 - Keyboards, pointing devices, voice
 - Direct manipulation
 - Menus, forms, commands
- Output devices & formats
 - Screens, windows, color, sound
 - Text, tables, graphics
 - Instructions, messages, help
- Collaboration & Social Media
- Help, tutorials, training
- SearchVisualization



www.awl.com/DTUI

Fifth Edition: 2010



HCI Pride: Serving 5B Users

Mobile, desktop, web, cloud

- → Diverse users: novice/expert, young/old, literate/illiterate, abled/disabled, cultural, ethnic & linguistic diversity, gender, personality, skills, motivation, ...
- → Diverse applications: E-commerce, law, health/wellness, education, creative arts, community relationships, politics, IT4ID, policy negotiation, mediation, peace studies, ...
- → **Diverse interfaces:** Ubiquitous, pervasive, embedded, tangible, invisible, multimodal, immersive/augmented/virtual, ambient, social, affective, empathic, persuasive, ...



HCI Futures

Micro-HCl → Computing, Psychology & Ergonomics

- Single user interfaces, technology-centered, narrow guidelines
- Short-term controlled studies & usability tests: speed & errors
- Clear requirements, benchmark tasks, self-efficacy, human performance measures, predictive models



HCI Futures

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Macro-HCI → Business, Sociology & New Media

- Social participation, motivation, trust, empathy, responsibility, privacy, collaboration, affective experience, morals, ethics
- Open tasks, long duration, novel user goals, community efficacy
- Voluminous logging data, case studies, ethnography
- New measures: giga-hellos, tera-contribs, peta-thankyous



Goal

Apply social media to transform society

- Reduce medical errors, obesity & smoking
- Promote energy & water conservation
- Prevent disasters & terrorism
- Increase community safety
- Improve education
- Facilitate good government
- Resolve conflicts



Wikipedia





Challenges

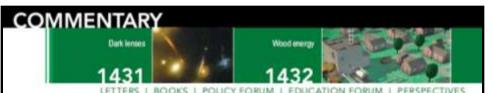
- Malicious attacks
- Privacy violations
- Not trusted
- Fails to be universal
- Unreliable when needed
- Misuse by
 - Terrorists & criminals
 - Promoters of racial hatred
 - Political oppressers



Early Steps

Informal Gathering College Park, MD, April 2009

Article: Science March 2009



LETTERS

BEN SHNEIDERMAN

A National Initiative for Social Participation

THE TRANSFORMATIVE POWER OF THE INTERNET IS MORE THAN ACCESS TO INFORMATION; it is increasingly about contributing, collaborating, and participating. Metaphors based on information highways are giving way to community visions that capture the remarkable enthusiasm for user-generated content and social media. At the same time, President Obama is calling for civic service and personal responsibility to rebuild America. Combining these ideas could promote the shift from playful, discretionary Internet usage to larger, more serious projects aligned with national priorities such as health care, community safety, education, and innovation.

The good news is that there are many promising social action networks, but these nascont explorations could be grouply accelerated by an organized research program. This pro-

gram would systematically study the emerging phenomena, determine the sources of success or failure, and disseminate best practices. The psynffs are large exough to warrant an intense national effort akin to NASA's space program or the National Institutes of Health.

Health discussion groups have long been one of the Internet's success stories. Now, clever entrepronours are exploring new social participation. ideas with projects such as the www.PatientsLikeMe.com Web site, where users offer their medical experiences in the hope of learning about treatment outcomes from one another. At the same time, these users are building a remarkable insource for medical research and discovery. Physicians have already discussed 30,000 cases at www.sermo.com. where they can offer insights about innovative treatments as well as detect

Innocuntive.com get hundreds of amusual disease patterns. Large corporations also recognize the opportunities and are inviting serious solutions from disease creative types.

menting on each other's work, arguing over quality criteria, and discussing what needs to be added. E. O. Wilson's dream of the Encyclopedia of Life, with a Web page for each of Earth's 1.8 million species, is on its way to becoming a citizen science success story that raises environmental awareness. Even YouTube, whose success was spiked by playful videos, is becoming the go-to educational resource and the place for students to post their term projects. These and many other initiatives are based on the collect-relatecreate-donate mantra that suggests education happens when students start by collecting information, then move on to working in teams to create ambitious projects for the benefit of someone outside their classroom.

Impovation itself is getting turbocharged by going notial. Open-source software projects are now taken seriously by hig companies who claim greater reliability for programs that hove. been tested and read by millions of eyes. Open innovation is gaining similar credibility as corponte research directors who post their problems on www.

National Initiative for Social Participation

Goal: to promote dramatically increased research support and educational opportunities for technology-mediated social participation especially as related to national priorities.

Draft: May 29, 2009



Organized by:

Ben Shneiderman, Univ of Maryland Peter Pirolli, PARC Jenny Preece, Univ of Maryland Ben Bederson, Univ of Maryland Derek Hansen, Univ of Maryland Harry Hochheiser, Towson Univ

Additional Contributors:

Hal Eden, Univ of Colorado Gerhard Fischer, Univ of Colorado Art Hanson, Nation of Neighbors Tom Malone, MIT Gary Marchionini, Univ of North Carolina Frank Moss, MIT Cynthia Parr, Smithsonian Institution Alex Pentland, MIT

http://iparticipate.wikispaces.com



NSF Workshops: Academics, Industry, Gov't

Technology Mediated Social Participation

U.S. National Science Foundation sponsored workshops



About Advisory West Coast East Coast
TMSP Committee Workshop Workshop

Conferences and Publications

Books

Courses

Research Groups

International Efforts

Bibliographic resources

TMSP Google Group

All around us, technology-mediated social participation has been harnessed for remarkable social benefits. New thrusts in basic research and engineering are likely to move beyond existing socio-technical media to produce new participatory systems spanning people, computation, communication and action. These developments could produce profound transformations in health care, community safety, disaster response, life-long learning, business innovation, energy sustainability, environmental protection, and other spheres of important national priorities.

Workshop Information

The west-coast workshop will be held on December 10-11 2009, at the Palo Alto Research Center (PARC), Palo Alto, California.





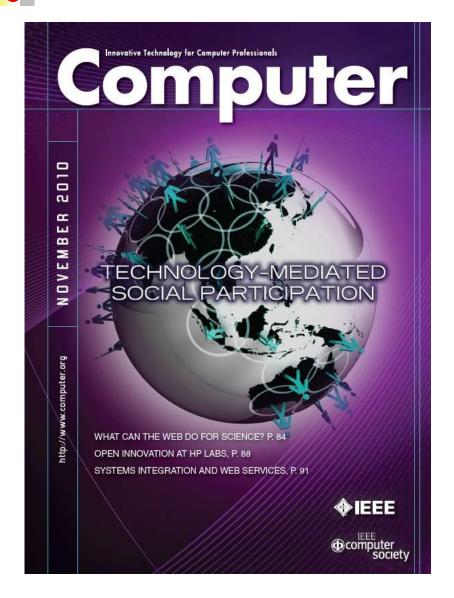




Jenny Preece (PI), Peter Pirolli & Ben Shneiderman (Co-PIs) www.tmsp.umd.edu



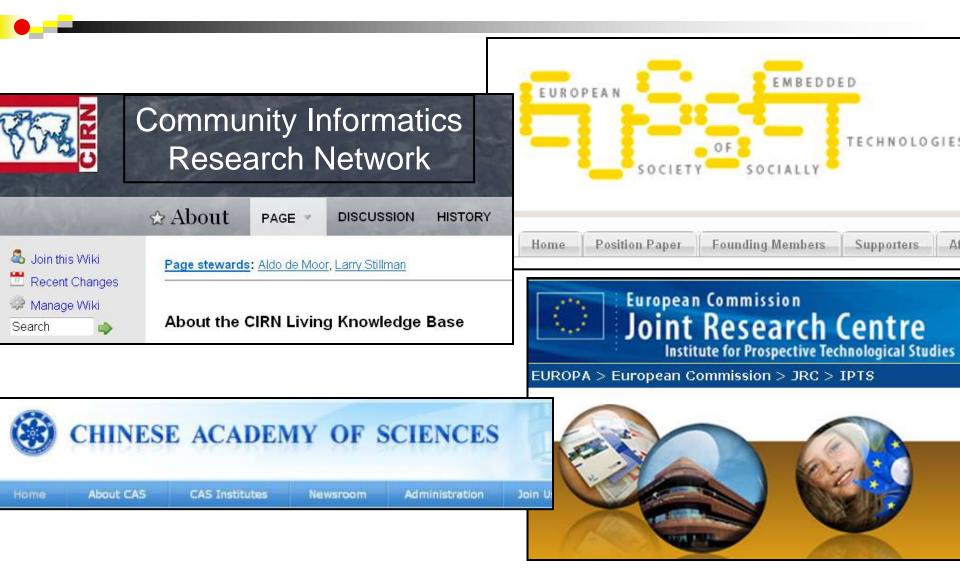
Cyberinfrastructure for Social Action on National Priorities



- Scientific Foundations
- Advancing Design of Social Participation Systems
- Visions of What is Possible With Sharable
 Socio--technical Infrastructure
- Participating in Health 2.0
- Educational Priorities for Technology Mediated Social Participation
- Engaging the Public in Open Government:
 Social Media Technology and
 Policy for Government Transparency



International Efforts





UN Millennium Development Goals



The Goals

- Eradicate extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

What are the Millennium Development Goals?

The eight Millennium Development Goals (MDGs) – which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – form a blueprint agreed to by all the world's countries and all the world's leading development institutions. They have galvanized unprecedented efforts to meet the needs of the world's poorest.

"We will have time to reach the Millennium Development Goals – worldwide and in most, or even all, individual countries – but only if we break with business as usual. We cannot win overnight. Success will require sustained action across the entire decade between now and the deadline. It takes time to train the teachers, nurses and engineers; to build the roads, schools and hospitals; to grow the small and large businesses able to create the jobs and income needed. So we must start now. And we must more than double global development assistance

NEWS FLASH

Millennium Development Goals Report 2006

UN ACTION

2005 World Summit United Nations Headquarters, NY 14-16 September 2005

Millennium Project

World Summit outcome

Millennium Development
Goals: Civil Society
Takes Action
58th Annual
DPI/NGO Conference,
7-9 September 2005, NY

Regional Reports

Economic and Social



Vision: Social Participation

1) Focus on National Priorities & Impact

- Disaster response, community safety
- Health, energy, education, e-government
- Environmental awareness, biodiversity

2) Develop Theories of Social Participation

- How do social media networks evolve?
- How can participation be increased?

3) Provide Technology Infrastructure

- Scalable, reliable, universal, manageable
- Protect privacy, stop attacks, resolve conflicts



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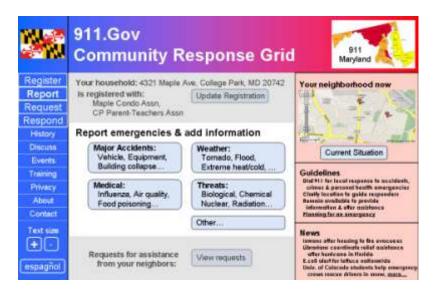


911.gov: Internet & mobile devices

- Residents report information
- Professionals disseminate instructions
- Resident-to-Resident assistance

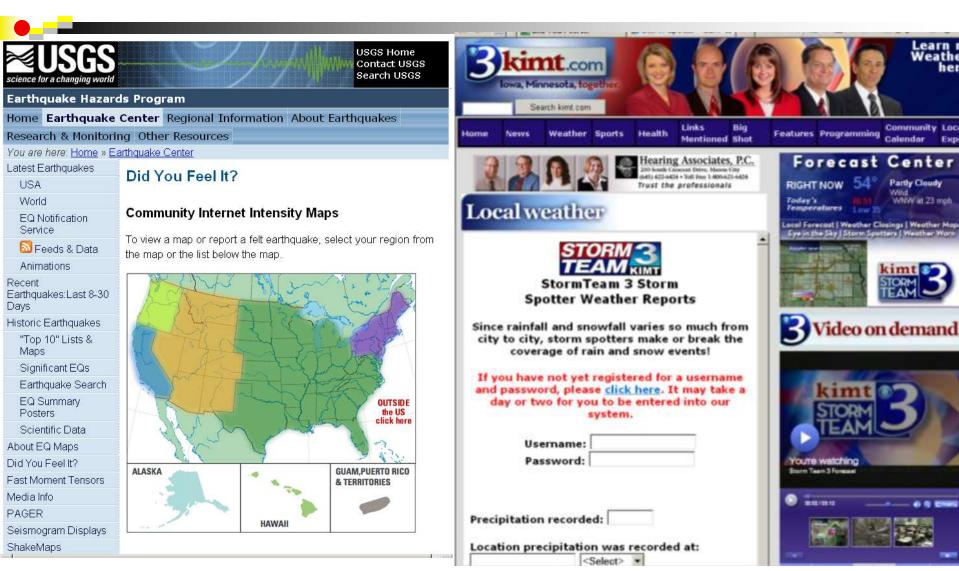
Sending SMS message to 911, includes your phone number, location and time

Professionals in control while working with empowered residents





Reporting: Earthquakes & Storms

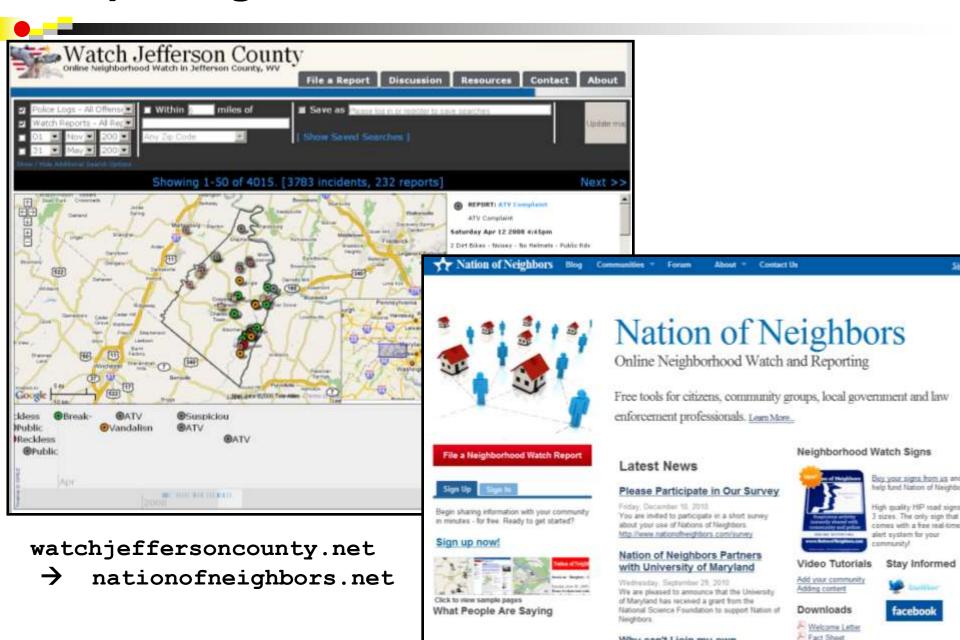


earthquake.usgs.gov/eqcenter/dyfi

weather.kimt.com

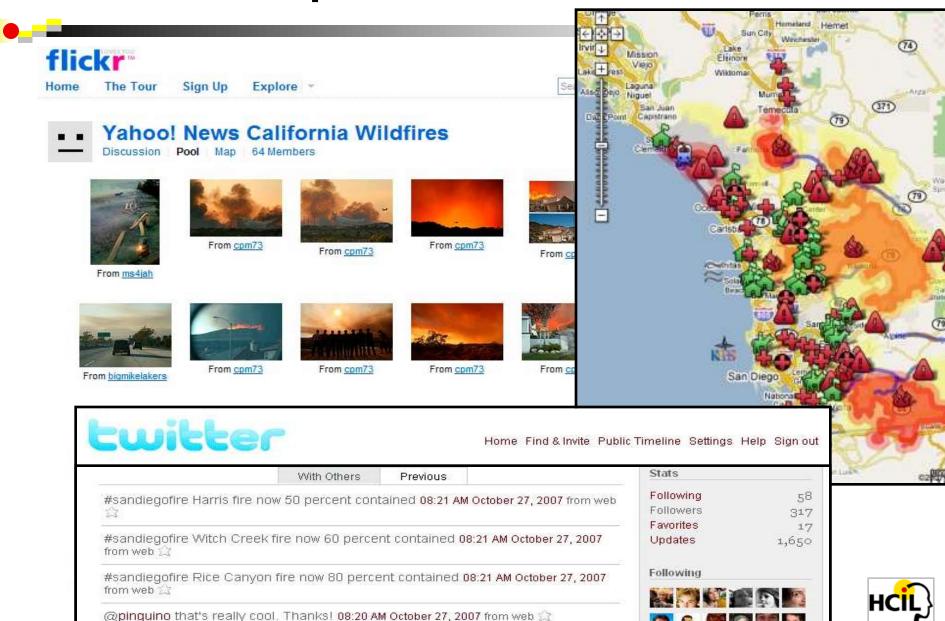


Reporting: Local incidents



Disaster Response: Wildfires

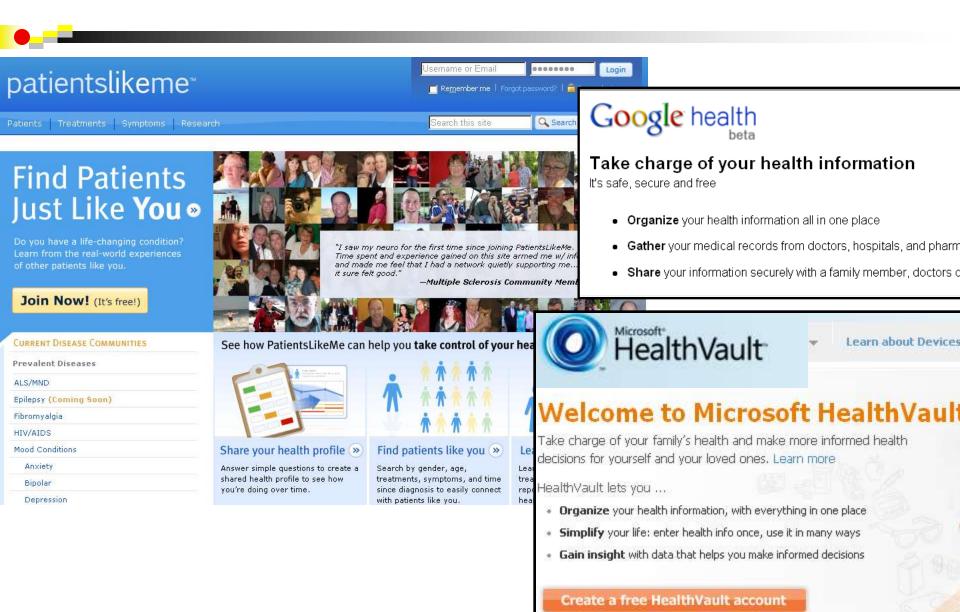
#eandiagnfire All Dal Dine recidents may return to their homes county officials



Community Safety: Abducted Children



Health & Healthcare



Already have an account? Sign in.

Doctor-to-Doctor Networks





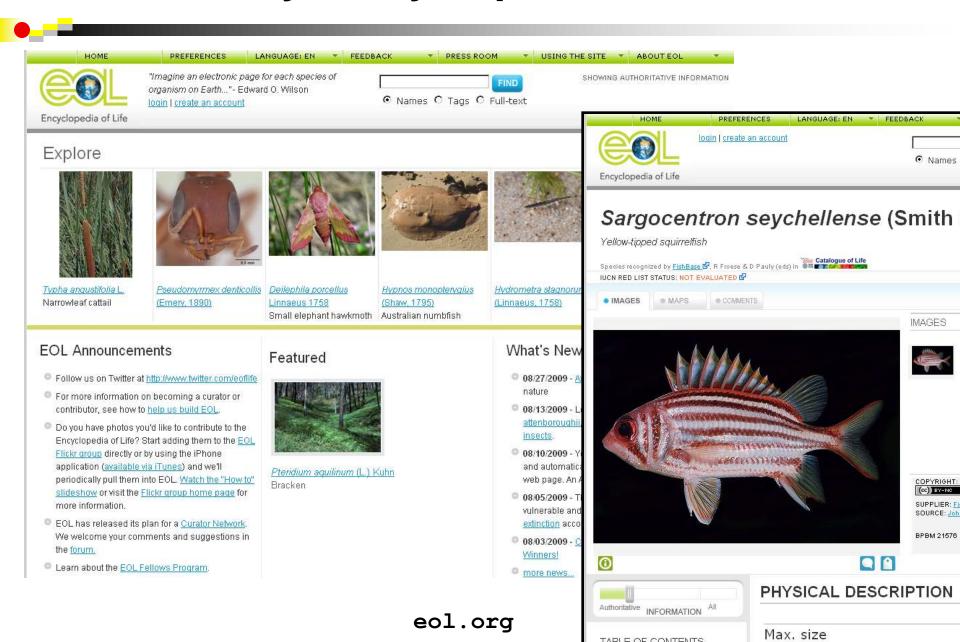
Energy Sustainability



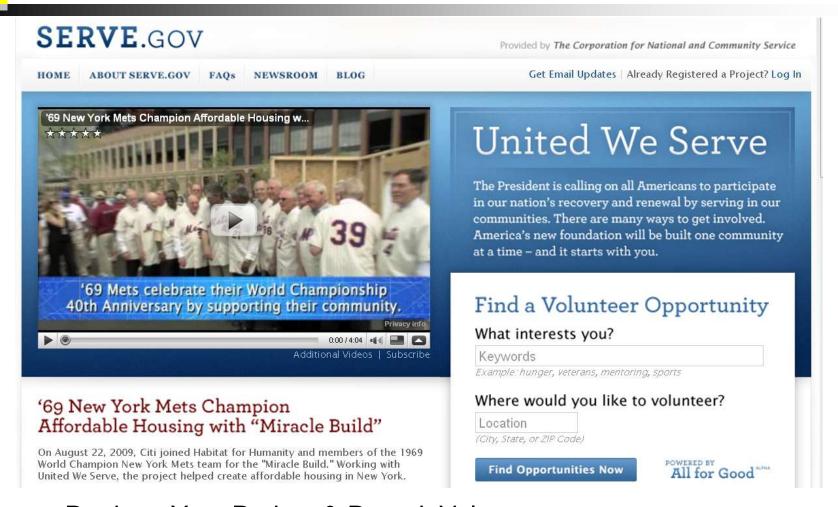
microsoft-hohm.com



Biodiversity: Encyclopedia of Life



Serve.gov: Voluntary service



Register Your Project & Recruit Volunteers
Find a Volunteer Opportunity
Read Inspiring Stories of Service & Share Your Own Story



Open Data.gov + Recovery.gov



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Network Theories: Evolution models

- Random, preferential attachment,...
- Monotonic, bursty,...
- Power law for degree (hubs & indexes)
- Small-world property
- Forest fire, spreading activation,...
- Matures, decays, fragments, ...

Watts & Strogatz, *Nature 1998*; Barabasi, *Science 1999, 2009*; Newman, *Phys. Rev. Letters 2002*Kumar, Novak & Tomkins, *KDD2006*Leskovec, Faloutsos & Kleinberg, *TKDD2007*



Network Theories: Social science

- Relationships & roles
- Strong & weak ties
- Motivations: egoism, altruism, collectivism, principlism
- Collective intelligence
- Collective action & governance
- Social information foraging

Moreno, 1938; Granovetter, 1971; Burt, 1987; Ostrom, 1992; Wellman, 1993; Batson, Ahmad & Tseng, 2002; Malone, Laubaucher & Dellarocas, 2009; Pirolli, 2009



Network Theories: Stages of participation

Wikipedia, Discussion & Reporting

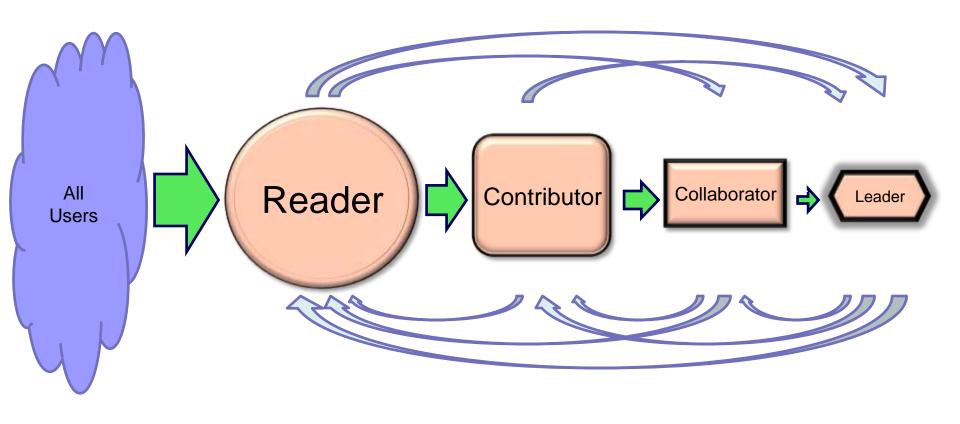
- Reader
- First-time Contributor
 (Legitimate Peripheral Participation)
- Returning Contributor
- Frequent Contributor

Preece, Nonnecke & Andrews, CHB2004
Forte & Bruckman, SIGGROUP2005; Hanson, 2008
Porter: Designing for the Social Web, 2008
Vassileva, 2002, 2005; Ling et al., JCMC 2005; Rashid et al., CHI2006



From Reader to Leader:

Motivating Technology-Mediated Social Participation



Preece & Shneiderman, AIS Trans. Human-Computer Interaction 1 (1), 2009 aisel.aisnet.org/thci/vol1/iss1/5/



Motivating Readers

Usability	Sociability
Interesting & relevant content presented in attractive, well-organized layouts	Encouragement by friends, family, respected authorities, advertising
Frequently updated content with highlighting to encourage return visits	Repeated visibility in online, print, television, other media
Support for newcomers: tutorials, animated demos, FAQs, help, mentors, contacts	Understandable norms & policies
Clear navigation paths → sense of mastery and control	Sense of belonging: recognition of familiar people & activities
Universal usability: novice/expert, small/large display, slow/fast network, multilingual, support for users with disabilities	Charismatic leaders with visionary goals
Interface design features to support reading, browsing, searching, sharing	Safety & privacy

Motivating Contributors

Usability	Sociability
Low threshold interfaces to encourage small contributions (no login)	Support for legitimate peripheral participation
High ceiling interfaces that allow large frequent contributions	Chance to build reputation over time while performing satisfying tasks
Visibility for users' contributions & impact - aggregated over time	Recognition for the highest quality & quantity of contributions
Visibility of ratings & comments	Recognition of a person's specific expertise
Tools to undo vandalism, limit malicious users, control pornography & libel	Policies & norms for contributions



Motivating Collaborators

Usability	Sociability
Ways to locate relevant & competent individuals to form collaborations	Atmosphere of empathy & trust that promotes belonging to the community & willingness to work within groups to produce something larger
Tools to collaborate: communicate within groups, schedule projects, assign tasks, share work products, request assistance	Altruism: a desire to support the community, desire to give back, willingness to reciprocate
Visible recognition collaborators, e.g. authorship, citations, links, acknowledgements	Ways to develop a reputation for themselves & their collaborators; develop & maintain status within group
Ways to resolve differences (e.g. voting), mediate disputes & deal with unhelpful collaborators	Respect for status within the community



Motivating Leaders

Usability	Sociability		
Leaders are given higher visibility & their efforts are highlighted, sometimes with historical narratives, special tributes, or rewards	Leadership is valued and given an honored position & expected to meet expectations		
Leaders are given special powers, e.g. to promote agendas, expend resources, or limit malicious users	Respect is offered for helping others & dealing with problems		
Mentorship efforts are visibly celebrated, e.g. with comments from mentees	Mentors are cultivated & encouraged		



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Technology Infrastructure

- Mobile, Desktop, Web, Cloud
- 100% uptime, 100% secure
- Giga-collabs, Tera-contribs
- Universal accessibility & usability
- Trust, empathy, responsibility, privacy
- Leaders can manage usage
- Designers can continuously improve



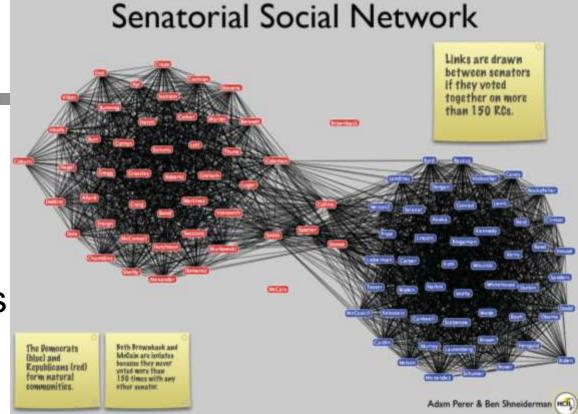
Footprints of Human Activity





Social Action

Integrates statistics & visualization

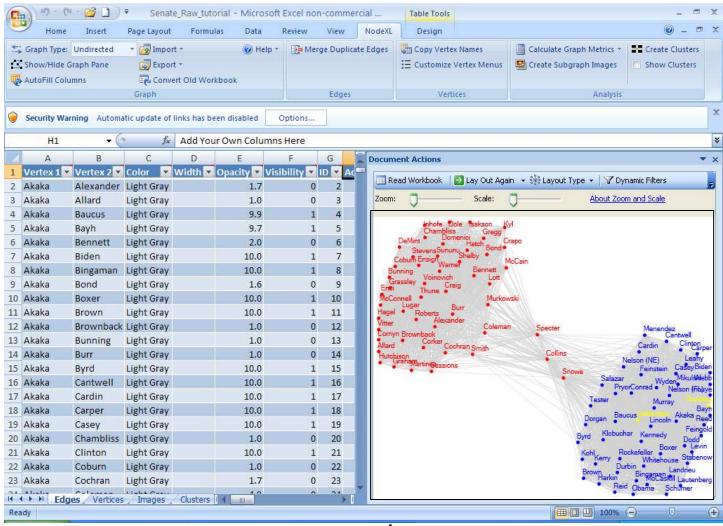


- 4 case studies, 4-8 weeks (journalist, bibliometrician, terrorist analyst, organizational analyst)
- Identified desired features, gave strong positive feedback about benefits of integration



NodeXL:

Network Overview for Discovery & Exploration in Excel

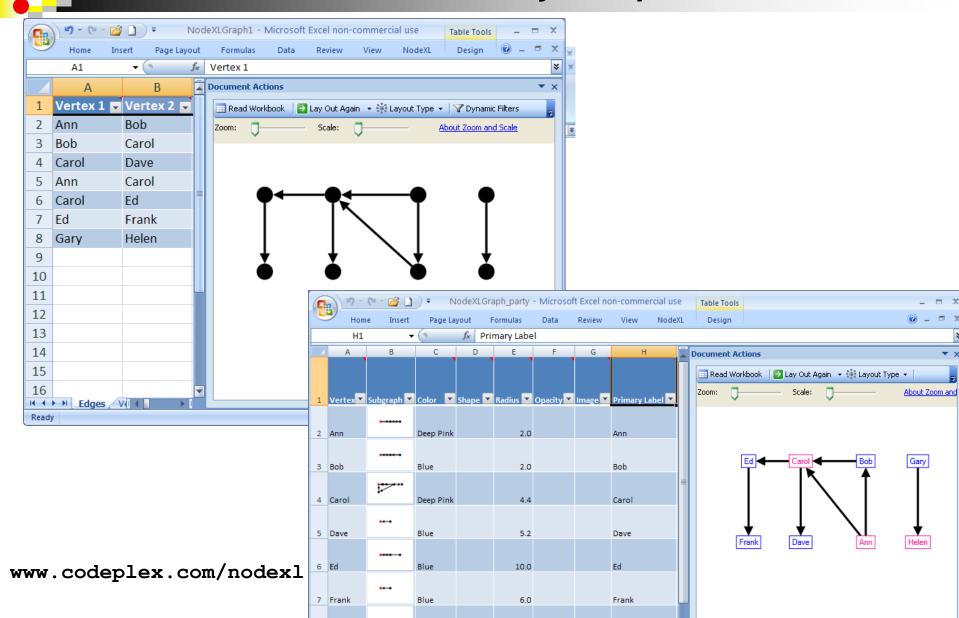


www.codeplex.com/nodexl
casci.umd.edu/NodeXL Teaching

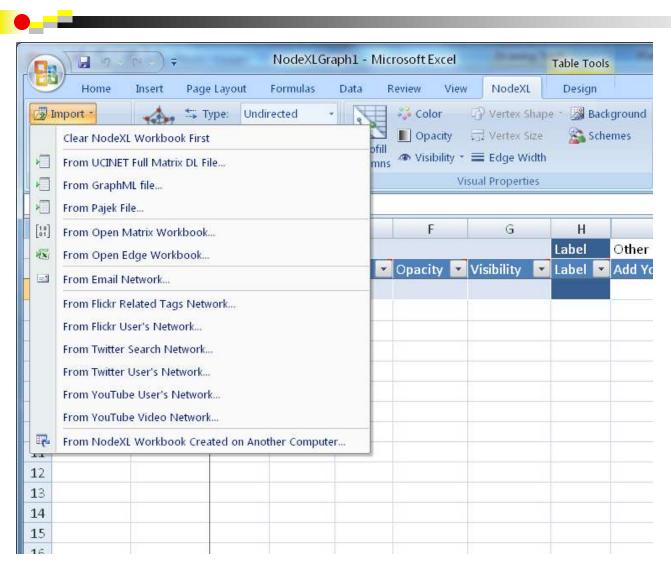


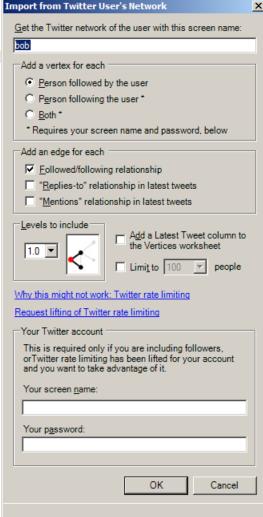
NodeXL:

Network Overview for Discovery & Exploration in Excel



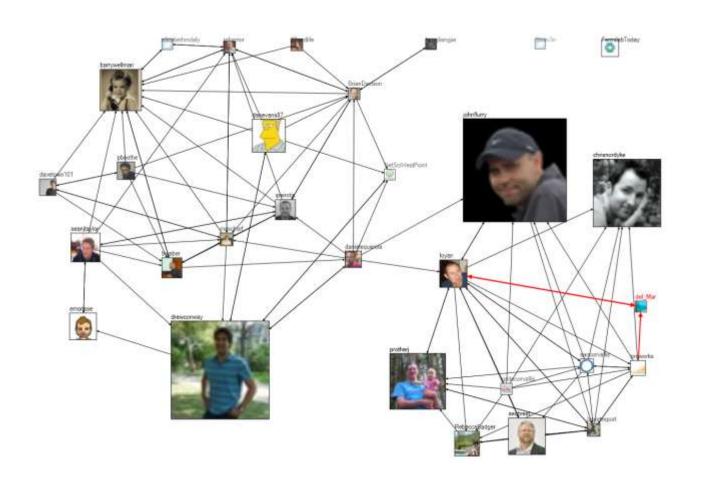
NodeXL: Import Dialogs





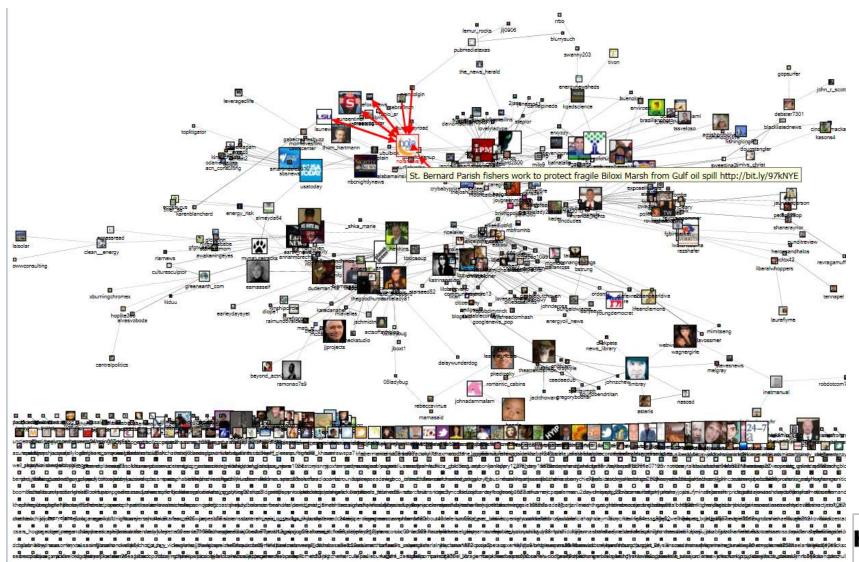


Tweets at #WIN09 Conference: 2 groups



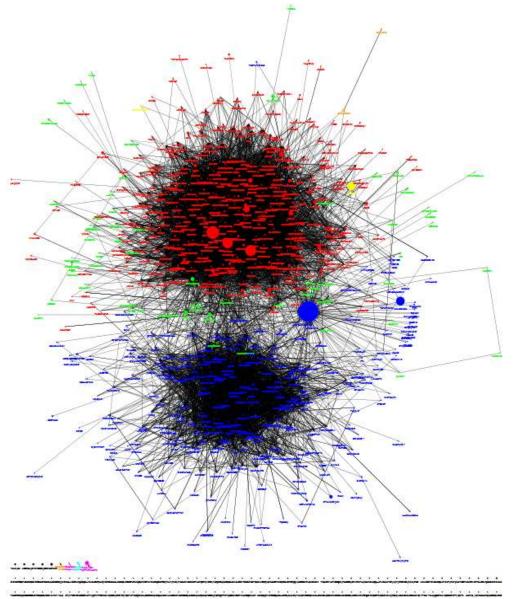


Oil Spill Twitter Community





Twitter discussion of #GOP



Red: Republicans, anti-Obama, mention Fox

Blue: Democrats, pro-Obama,

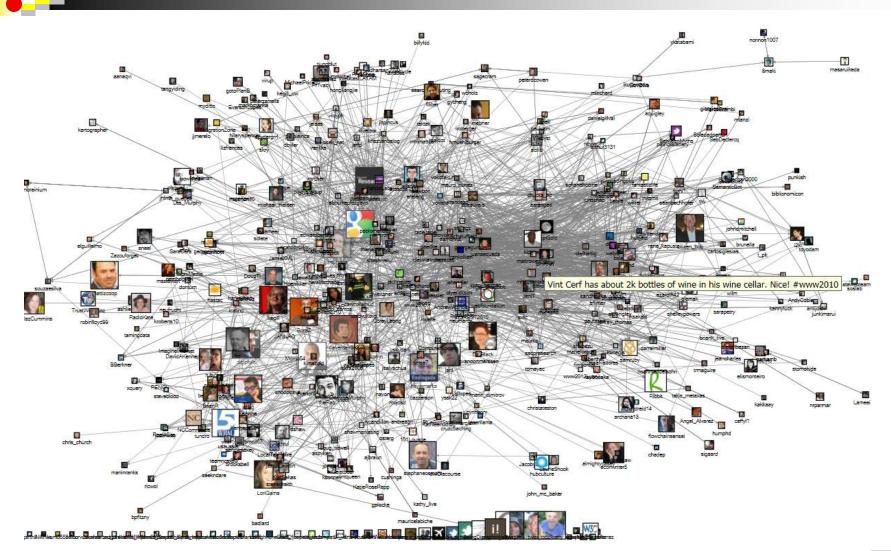
mention CNN

Green: non-affiliated

Node size is number of followers Politico is major bridging group

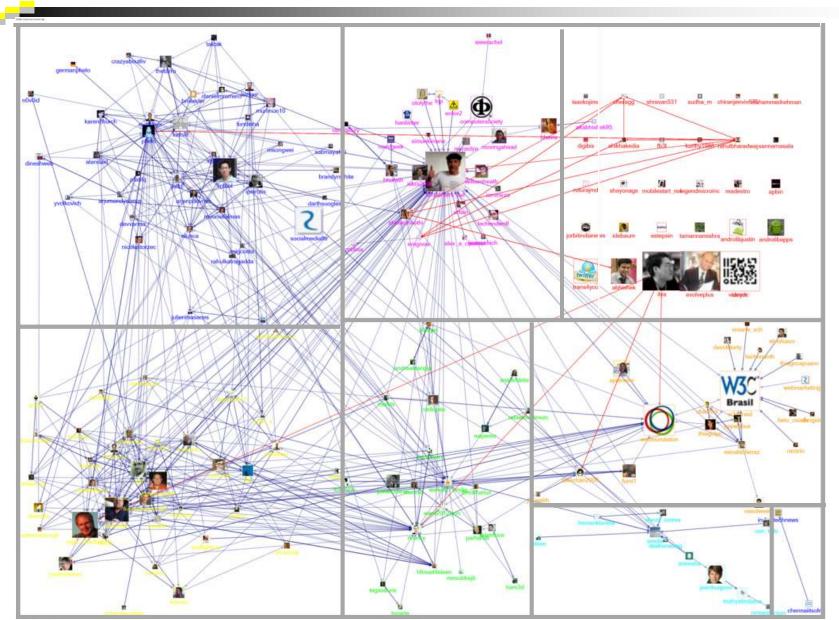
1		Graph Metrics						
i	Vertex E	Salaran D	In- Degree •	Out :		Centrality .	Eigenvector Centrality	Pagettaris E
1	politica		111		63483.406	0.001	0.062	8.34
A	scottingrives		158	50	45379,321	0.001	0.007	6.95
5	cOnservative1	•	346	90	34064.604	0.001	0.009	6.06
8	artzona_freedom	•	190	103	38549.034	0,001	(0.009	5.74
7	conservative432		135	74	20294.618	0.001	0.009	5.16
٨	kosmosnet		311		13681.759	0.001	0.005	4.10
3	katyinindy		338	-24	12679.060	0,001	0.007	4.76
10	goodporkbadpork			40	12209.131	0.001	0.001	2.23
ii	Terrysabeto		-0	,	9425-256	0.001	0.002	2.34
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WWW2010 Twitter Community



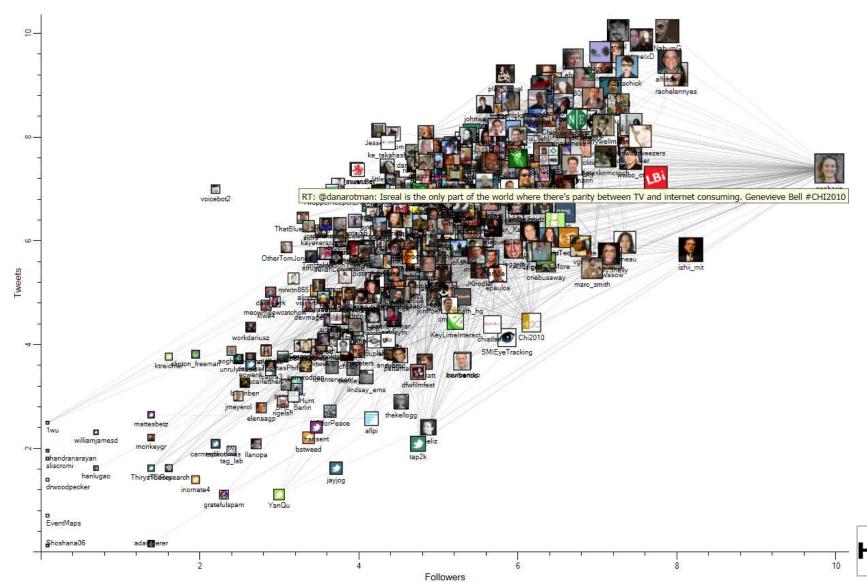


WWW2011 Twitter Community: Grouped



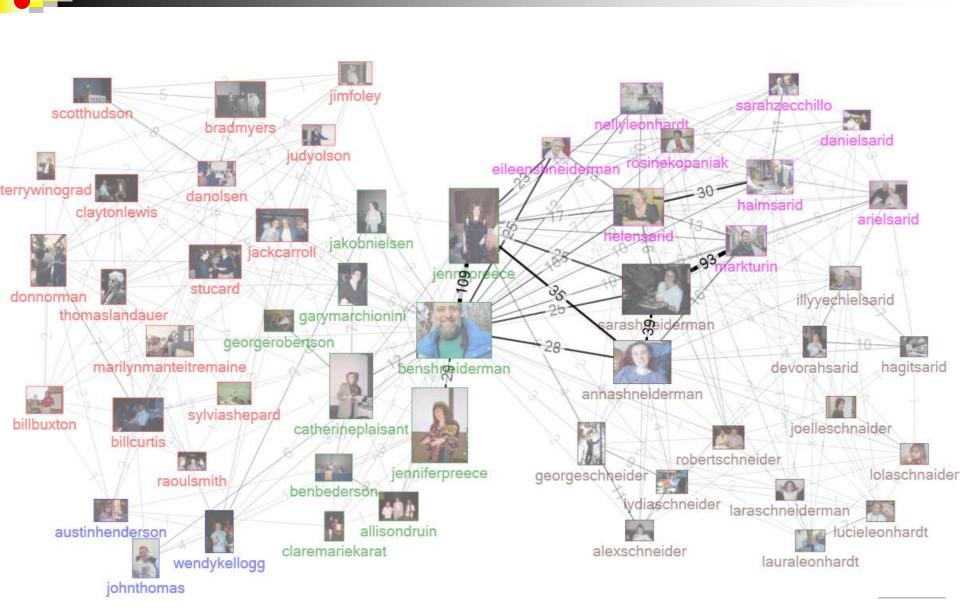


CHI2010 Twitter Community

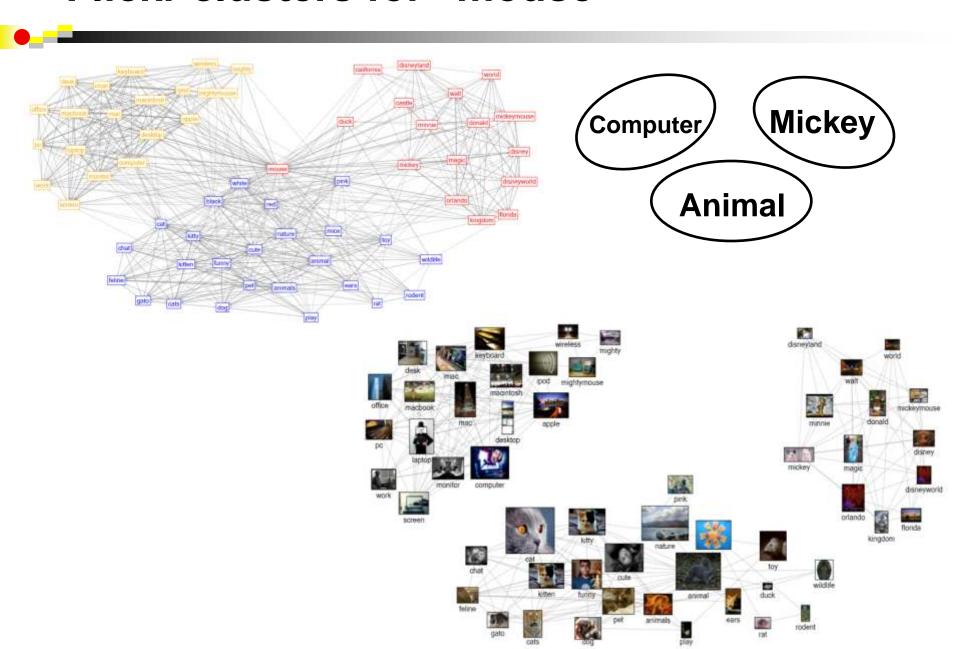




Flickr networks



Flickr clusters for "mouse"



Flickr commenters on Marc Smith's pix

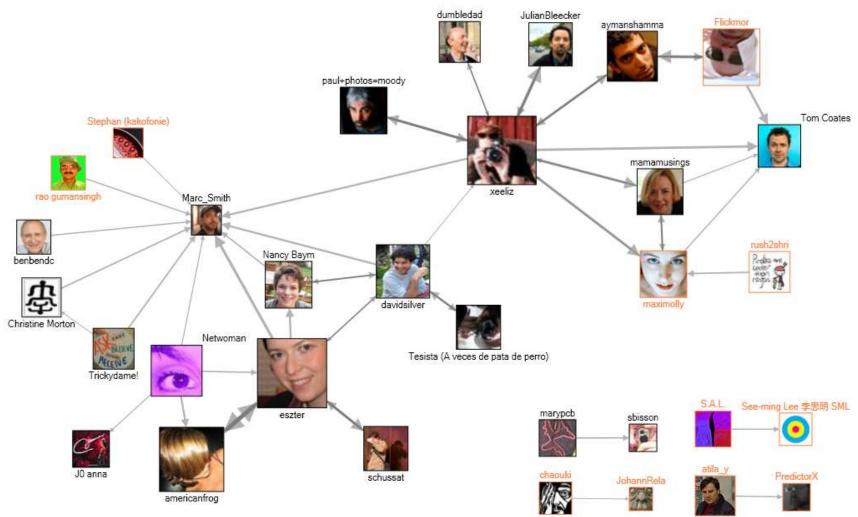
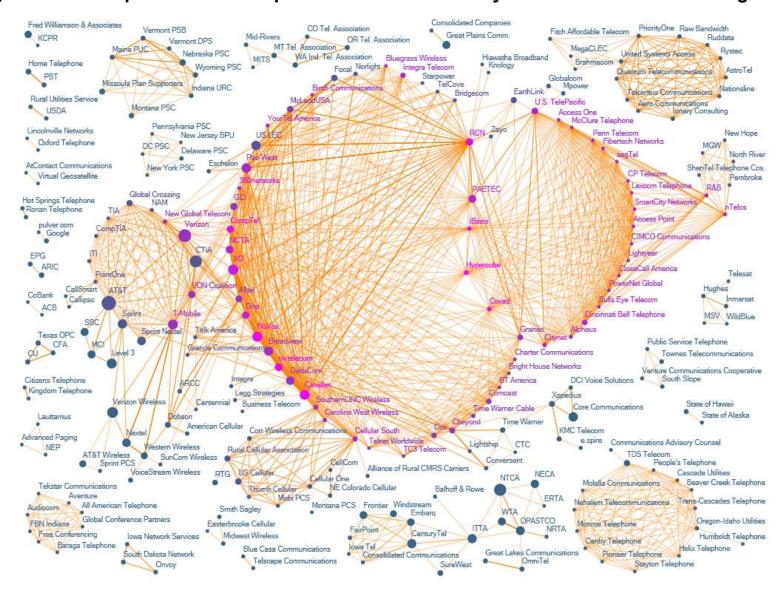
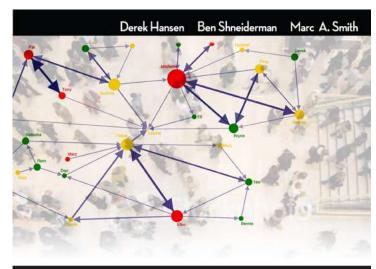




Figure 7.11.: Lobbying Coalition Network connecting organizations (vertices) that have jointly filed comments on US Federal Communications Commission policies (edges). Vertex Size represents number of filings and color represents Eigenvector Centrality (pink = higher). Darker edges connect organizations with many joint filings. Vertices were originally positioned using Fruchterman-Rheingold and hand-positioned to respect clusters identified by NodeXL's Find Clusters algorithm.



Analyzing Social Media Networks with NodeXL





I. Getting Started with Analyzing Social Media Networks

- 1. Introduction to Social Media and Social Networks
- 2. Social media: New Technologies of Collaboration
- 3. Social Network Analysis

II. NodeXL Tutorial: Learning by Doing

- 4. Layout, Visual Design & Labeling
- 5. Calculating & Visualizing Network Metrics
- 6. Preparing Data & Filtering
- 7. Clustering & Grouping

III Social Media Network Analysis Case Studies

- 8. Email
- 9. Threaded Networks
- 10. Twitter
- 11. Facebook
- 12. WWW
- 13. Flickr
- 14. YouTube
- 15. Wiki Networks



Social Media Research Foundation



We are a group of researchers who want to create **open tools**, generate and host **open data**, and support **open scholarship** related to social media.



Let's get to work!

- Do great research!!!! → Inspirational
- Universities
 - Add courses & degree programs
 - Help Federal & Local governments
- Industry
 - Offer researchers access to data
 - Develop infrastructure and analysis tools
- Government
 - National Initiative for Social Participation
 - Develop Federal & Local applications

