NSF Technology Mediated Social Participation Workshop

Design of Social Participation Systems

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Group 2 Participants: People's Background and Experiences

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- Sarah Vieweg works on group coordination in the domain of emergency response.
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1. A Motivating Vision for the Future

It is 2014 and Venezuela is struggling to meet the new targets set for reducing biodiversity loss under the Convention on Biological Diversity. Angela is a college student passionate about rainforests. She loves watching documentaries and knows that her country is rich in biological diversity but figures there isn't much she can do about it

other than write term papers and send e-mails demanding action. She is a biology major, but as she lives in Caracas, the closest she has come to biological diversity has been photographing flowers in city parks.

After receiving an invitation on one of the flower images she's posted on Flickr, Angela adds it to the Encyclopedia of Life images pool. Her image is automatically incorporated into a growing online encyclopedia, http://www.eol.org. She and her family are excited to see her image illustrating text from Wikipedia, as well as a highly technical description from botanists on the eFloras project. She finds many EOL pages can use her images, and is pleased that EOL curators always rate them highly.

She'd like to translate the technical English into readable Spanish but isn't sure how to do that. Also, an EOL curator commented that she misidentified one of her Flickr images. She fixes it right away but she's got mixed feelings – are her photos unwelcome? Many of her images remain unreviewed as there are no active curators for those organisms. One of her professors has the expertise to review her photos but he tells her he doesn't have time to participate. He must publish in scientific journals in order to get promoted. On the bright side, her professor does not allow his students to cite Wikipedia in their term papers but gives her permission to cite Encyclopedia of Life because it has expert review.

Through a discussion on an EOL page for a native plant she has seen, she meets several amateur and professional botanists. The map on EOL for that species shows no points in her area, but her new friends explain that it is rare and often confused with another species. They add this information to the EOL page so others will know, and use EOL to make a list of related species that might be found in a nearby national park. Over the next year they take several field trips for photographs and slowly build rich EOL pages for these plants. They help the park naturalist make a field guide using EOl, and also help organize a BioBlitz, a one-day inventory event. Together with scientists they document new populations of rare plants. Angela's friends mount a citizen science effort to collect data to determine if these plants are at risk of extinction due to climate change. The results of their work are freely available and downloadable from EOL pages. This has been the most rewarding set of experiences she has had in college and it didn't happen in her classroom.

This real-life scenario highlights many of the challenges that designers of systems to support technologically-mediated social participation face. A grand challenge, then, is to understand how to better design systems for social participation by learning from across several research communities, and how to better integrate lessons learned from practice back into theory. At the high level, this includes several sub-challenges:

- How can systems effectively aggregate and integrate information from experts and novices, and from people with different training, perspectives, and vocabulary? How can information provided by

people be integrated with information from sensors or other behavior traces? What data integration technology do we choose when partners vary in ability, platform, and schemas?

- How can designers detect and prevent participation that attempts to cheat or game the system, without deterring other participation?
- How can designers motivate contributions and other activities? What incentives are inherently present and what should be provide or designed into the system?
- How can tasks be matched to people with appropriate skills and interests?
- How should the system be tailored to people with different skills, interests, and needs?
- How can designers and system builders best generate, refine, and evaluate design ideas, and who should be involved in this process? How to chose among conflicting design ideas?

These are no longer entirely open questions; the efforts of countless researchers and practitioners have substantially advanced both theory and design practice. Technologies that better facilitate access, aggregation, manipulation, and presentation of data by end-users have also broadened the ranks of designers, builders, and administrators of tools and systems to support social participation.

Much more work, however, is yet required to support designers of technology-mediated social participatory systems. In research, many attempts to design from theory have resulted in naïve and not always effective instantiations. On the other hand, there are many highly effective designs that are not necessarily adequately explained or predicted by theory. The purpose of our exploration is to understand how we can close this gap.

In this chapter, we first review recent technological and social trends and their implications for designing social participatory systems. We then outline major design issues when building these systems, and propose both avenues of exploration and the necessary infrastructure to conduct these inquiries on a large scale.

2. Introduction

For a couple of decades, the affordances of digital media have been providing new powers for the *individual*. It is now apparent that the emerging cyberinfrastructure is providing enormous unexplored opportunities for *groups, communities*, and *societies at large.* One of the most exciting of these opportunities, with profound implications in the years to come, involves innovations and transformations that provide members of the public with new information and communication technologies which support them in becoming co-creators of new ideas, knowledge, and products in personally meaningful activities [Shneiderman2007].

We are in the midst of the "decade of social media." Increasing uses of social media and social participation sites has led to dramatic changes in the way science, government, healthcare, entertainment, and enterprises operate. Large-scale participation in social participation systems has resulted in some incredible opportunities to employ online communities for greater good. The time is ripe to capitalize on this activity, and create socio-technical ecosystems that can harness the wisdom of crowds via social media [Surowiecki2004].

Research on social media has emerged from a set of activities aimed at understanding and developing technologies that enhance the intelligence of users, individually and in social collectives [Bush1945], through socially mediated information production and use, particularly in many new popular social websites and networks. In part this is a natural evolution from research work around improving information seeking and sense making on the Web [Chi2008]. In part this is also a natural expansion in the scientific efforts to understand and enhance the intelligence of the individual users coupled to information systems.

In order to realize the potential of social media for positive change, one major research challenge is to understand how to design for effective social participation [Girgensohn2002] and to employ techniques from theoretical studies of social capital and networks [Granovetter1973, Burt1995].

Social media create technological, economic, and organizational disruptions that provide foundations to rethink and redefine learning, working, and collaboration and create new support environments for *creativity and design*, specifically *social* creativity and *collaborative* design. This transformation complements c*onsumer cultures*, which are dominated

by producing finished and deliverable artifacts (such as movies, music, and software systems that are fully specified at "design time" and consumed passively at "use time"), with c*ultures of participation*, which are focused on the demands of *active contributors* who want *open and evolvable environments* to create solutions by and for themselves [Lessig2005]. By providing infrastructures, seeds, and mechanisms for user-generated content, the fundamental transformation that we seek to understand complements and transcends Web 1.0 environments, which are dominated by broadcast media developed by professional designers for passive users, with the participatory Web2.0.

We propose studies that will:

1. Explore particular design principles for social participatory systems, focusing specifically on three classes of design issues: (a) the understanding of what domains might benefit from mass social participation; (b) the exploration of components, tools, and techniques for social participation; and (c) the mapping of factors that affect users and communities.

2. Understand the overall architecture and model of social participation, and how the model interacts with social computing techniques such as recommendation engines, visual analytics, and social voting systems; and explore the interaction between users and communities with human and machine intelligence techniques.

3. Develop best practices for how to design for different contexts and types of challenges.

To facilitate these inquiries, infrastructure investments that span research and practice communities will be necessary. In particular, we propose:

1. A depository for data sets from existing communities. This depository will be responsible for facilitating data contributions, archiving the data, and granting appropriate levels access to researchers with pre-reviewed research plans requiring the deposited data.
2. A research center or centers that experiments on live platforms of social participation systems -- a Living Laboratory that focus on impacts in real domain areas. We seek to engage in efforts which are

a. **multi-disciplinary** (bringing together researchers, practitioners, and citizens from different disciplines);
b. **multi-sector** (supporting collaborations between academia, industry, startup companies, as well as domains such as open government, social healthcare and education.
c. **international** (understanding and fostering developments that transcend national and societal boundaries).

3. Background

Technology Trends

Web2.0 and Social Computing technology arise out of the new wave of computing techniques now making dramatic changes on the Web in full-force. This new wave is a combination of new development on several fronts:

1. *Software as a Service or Web Cloud as platform.* Web technologies have advanced to the point that the Web itself (and other connected networks) has become a computing platform for the delivery of novel features, tools, applications, and services. The computing platform involves a heterogeneous mix of technologies including REST, XML Web Services, RSS/Atom, and AJAX. This software provides the plumbing and necessary nuts and bolts to support rich user interaction, mashups or remixing of Web Services, and the formation of social groups and interactions.
2. *Mashups: Harnessing network effects of technology innovation.* One consequence of the Web as platform is that it fosters innovative combinations of services, i.e. the connection of search engines or RSS feeds to Google Maps (a web service) to deliver results with geographical data to end-users.
3. *Rich interaction.* New Web user interfaces no longer rely on the old paradigm of submitting results to the server and waiting for a new page to load. Instead, in its place, we have rich interactive applications that use asynchronous communication to servers to deliver fully interactive user experiences [Zucker2007]. With higher bandwidth, not only is there more "rich media" (e.g., video), but a richer variety of user-friendly ways to interact with content.
4. *Harnessing network effects of knowledge production and use.* Perhaps the most significant and exciting consequence of the evolution in technology is the emergence of novel *architectures of participation* that

draw users to contribute value, and that gain value as more users cooperate [Shapiro1999]. Novel systems support the creation and aggregation of knowledge through cooperative peer production (e.g., Wikis, blogs, social bookmarking), and others that augment intelligence through cooperative reasoning and judgment (e.g., prediction markets; voting).

Research Trends

Researchers are also similarly seeing a surge of new research on Web2.0 technologies distributed in a wide variety of disciplines and associated conferences. Research on social participation systems span a spectrum of collaborative scale:

- At the light end of collaboration spectrum, we have researchers trying to understand the micro-economics of voting systems, of individual and social information foraging behaviors, processes that govern information cascade, and wisdom-of-the-crowd effects. Economists are trying to understand peer production systems, new business models, and consumption and production markets based on intrinsic motivations. This also include individual activities that, on their own or aggregated across many individuals or time, support *unintended collaboration*. The behavior traces left by lurkers and consumers of content can be a tremendously powerful tool, both for motivating and shaping the contributions of others or for detecting trends of significance, such as Google's ability to detect flu trends based on search behavior (http://www.google.org/flutrends/).

- At the middle of the collaboration spectrum, researchers are building algorithms that mine new socially-constructed knowledge structures and social networks. Here physicists and social scientists are using network theories and algorithms to model, mine, and understand these processes. Algorithms for identifying expertise and information brokers are being devised and tested by information scientists. Many researchers are developing their own network analysis techniques and applying them to social tagging data and constructed prototypes.

- At the heavy end of the collaboration spectrum, the understanding of coordination and conflict costs are especially important for collaborative creation systems such as Wikis. Researchers are

studying characteristics that enable groups of people to solve problems together or collaborate on scientific endeavors. Discoveries such as the identification of invisible colleges have shown that implicit coordination can be studied and characterized [Sandstrom2001]. For example, researchers have published in the area of understanding the coordination costs in Wikipedia [Kittur2008].

We seek to understand the Design of Social Participation Systems and Issues surrounding Social Capital and Networks. Modelers and scientists are trying to understand how to bring down the cost of social interactions, and understand the cost/reward structure for individuals. They are also building characterization models of what, how, and why people are behaving the way they do. Field studies, log file and content analysis, as well as cognitive task analysis are all possible studies to conduct in this space.

4. Design Issues for Social Participation Systems

When we consider social participatory systems and the possible benefits that may arise from their implementation and use, *large-scale participation* is a necessity. The types of problems and issues that may be aided or solved with such systems are complex and transcend the individual mind. They require synthesizing *different perspectives*, exploiting *conceptual collisions* among concepts and ideas coming from different disciplines, managing *large amounts of information* potentially relevant to a collaborative task, and understanding the decisions that have determined the *long-term evolution* of a system.

The primary design issues relating to social participation systems is to understand the relationship between usability, sociability, social capital, collective intelligence, and how to elicit effective action through design.

- **Usability** concerns the ability for all users to contribute, regardless of accessibility requirements, computing experience, and costs associated with working with these systems.
- **Sociability** refers to the skill or tendency of networking, making connections and interacting well with others. Designers can facilitate and lubricate social interactions amongst users of a system through detailed research and careful considerations of how sociability happens off-line.

- **Social capital** refers to positions people occupy in social networks, and their ability to utilize those positions toward goals. Designers need to enable people to sort themselves into comfortable positions within social networks, including leadership and follower positions.
- **Collective Intelligence** refers to the emergence of intelligent behavior amongst groups of people that involves collectively defining and reaching goals. Designers can create mechanisms such as voting systems, folksonomies, and other opinion aggregators to ensure the emergence of collective intelligence over time.

While technical conditions create a strong potential, their existence alone is not sufficient. Research on s*ocio-technical systems* are required to understand how to (1) reduce the burden to acquire the technical knowledge and social skills necessary to participate, and (2) motivate and reward people for becoming active contributors. Beyond analyzing the skills and knowledge to participate, we need to understand under which conditions humans will take the time and effort to make contributions. This understanding will require the exploration of concepts such as intrinsic motivation, gift cultures, and social capital.

The principal concern for designers of systems is to ensure that participants both give and get something from the system that is beneficial to individuals as well as to the group. This may take the form of being challenged in their ideas, or to contribute to the overall knowledge of a domain, or to contribute their experiences.

Most importantly, social participation systems should encourage users to take part in **effective action**. One main design principal here is that ***effective action arises from collective action***. By encouraging participants to learn from each other and to form consensus, group goals arise and groups can act. A good example of this is Wikipedia, in which a group of people came together for a variety of individual motivations and perspectives, but their individual efforts contribute to the collective outcome of creating an encyclopedia of the state of human knowledge for broader distribution. Collective action resulted in effective change in the way people access information. However, the success of Wikipedia also raises interesting controversial issues as to whether there is a "Wisdom of the Crowds" and whether the world will now suffer from an overload of mediocre products and ideas [Lanier2010]. Research is needed to understand how the Long Tail [Anderson2006] can be exploited to

improve social creativity.

5. Categories of Design Issues

Broadly speaking, to understand how systems builders should design the mechanisms in social participatory systems, we need to answer questions that are roughly divided into three major categories: knowledge-ware, tool-ware, and people-ware. Here we explain the categories and some sample questions we used as discussion points:

Knowledge-ware (Domain Context)

Knowledge-ware refers to the understanding of domains and contexts in which large-scale social participation could have great impact. Consider a simple design claim: design feature x will result in behavior or outcome y. On its own, this seems straightforward, but it is also incomplete. Feature x might produce outcome y in the health domain but an entirely different outcome in the open government domain, or it might hold true for systems in which people *must* participate but not for opt-in or opt-out systems. For design of real systems, context and domain matters.

TMSP systems are appearing across a variety of domains, including healthcare, education, government, enterprise innovation, energy & sustainability, citizen & public science, emergency response & preparedness, and civic participation. We need to understand how these domains and the different classes of systems that designers may build interact with the design choices.

Basic questions we will seek to answer include: What are some of the vertical domains in which social participation, if done at a massive scale, would dramatically disrupt current solutions? For example, how can we dramatically change textbooks by making them a complete social experience? In various domains, how do we design these systems for cold start, adoption, growth, and maintenance?

Other dimensions of context that designers must consider include community life stage (a choice that works in the startup phase may not be appropriate for the same community as it matures) and individual differences (e.g., a feature that motivates one user may de-motivate another user).

Some candidate domains to explore initially include healthcare, education, open government, and enterprise innovation. Other domains worth considering include energy/sustainability, citizen science, and emergency response.

Tool-ware (Techniques)

Tool-ware refers to the system components that enable effective social participation. The continued advancement and maturation of a broad range of technologies will be necessary to augment, enhance, and efficiently apply many human capabilities. The key capabilities for social participation can be enhanced or expanded through certain technologies and techniques. These include:

The ability to recognize, extract, and identify patterns. Techniques and technologies include machine learning, folksonomies and informal classification methods, personal and group informatics, social network analysis, and visualization techniques.

The ability to find and access desired or needed information. Technologies and techniques include social search, recommendation and voting systems, and standards for the provision of metadata and distribution of data.

The ability to augment and aggregate human intelligence, by providing powerful analysis and visualization tools. How does social cognition or social intelligence work when large numbers of people have access to potent collaboration technologies? Technologies and techniques include expertise finding and matchmaking, augmentation of human curation or organization of content, workflow and process control and management, decision support systems, prediction markets, and tools for machine and human summarization and distillation in knowledge production.

The ability to communicate complex ideas and communicate with many people. This includes the ability to share without creating clutter or overload, information visualization, and group and personal dashboards

The matching of tasks with people who are (1) motivated and (2) appropriately talented or skilled. How do designers and administrators apply the appropriate community intelligence for the right tasks? How can

designers make a system inherently appealing or desirable to use, or how can they design appropriate extrinsic rewards? What should designers do when different types of incentives compete? Micro-task markets, such as Amazon Mechanical Turk or Question and Answer sites, and peer production systems fit into this space.

Many low-level infrastructure issues, such as cloud computing, underlie these techniques. Better tools and methods, such as Google's Website Optimizer, might make it easy for designers to evaluate the effects of different design choices.

People-ware

People-ware refers to understanding how people act in social cognitive systems, in which users function as both individual and social agents. We need better models of users and communities, and better knowledge of how to build sociotechnical systems from theory. What mechanisms and policy decisions result in the emergence of collective intelligence?

- Beyond opinion aggregation and crowdsourcing, how do social cognition systems work with human intelligence? Here, human intelligence broadly refers to new techniques utilizing human computations such as Amazon Mechanical Turk and games-with-a-purpose techniques.
- How do we design systems that make social interactions between users seamless? Social interactions here broadly include communication behaviors such as commenting, replying, annotation, distribution and broadcasting of information.
- How do conflict and coordination get designed into social participation systems? What are the governing policies and design principals and how are they implemented?
- How do the governance, policies, and norms of a system emerge? What behaviors should be designed in code, mandated in policy, or encouraged by norms?
- How do we enable multiple point-of-views to be represented in a social system? In designing a system, how do we encourage debate and discussion between potentially balkanized groups?

Practice is also not merely a consumer of theory about how people behave but a source of knowledge. The real-world successes and failures of design ideas derived from theory have driven and will continue to drive

refinements in theory. Researchers will need listening posts and communication channels that facilitate learning from these real world experiences and production of new design ideas in an iterative fashion.

For people-ware, an important scientific goal is the understanding of the "architecture of social participation." It is vital to understand users' and groups' goals, and how to support and augment their ability to think and reason. To do this, we need to build better models of social participation. By understanding why and how people participate, we will be in better position to understand the architecture of systems that aim to build and nurture social participation. That is, we need the understanding of how to create better systems for (1) information diffusion; (2) accurate information and facts; (3) engagement; (4) broad engagement; (5) faster response; (6) enabling emergent practices; (7) higher productivity.

Integration of understanding between Context, Techniques, and People

Of course, instead of separately understanding the research questions in each of the above three categories of Context, Techniques, and People, we also need to understand how they interact and integrate in social systems. We do not yet know the how contexts, techniques, and people/communities interact. What makes the research problem of designing for social participation different from designs for other interactive systems? What kinds of frameworks and models are specific to this area? And in particular, what are things that if we don't work on, it would not be done? For example, in social healthcare systems such as CureTogether (http://www.curetogether.com/), we must understand what techniques are required to support a patient community to come together and solve medical problems. What are characteristics of the medical domain that change the interaction techniques we can employ? Do privacy issues trump openness design principals? Do we have to use different sharing techniques to preserve anonymity? We suggest that one important research issue to focus on is to understand "what kinds of parameters we can change in a particular social participation system that would result in different behaviors?"

To answer these questions, we need to interact and connect with researchers in behavioral economics, incentive networks, political science, and the study of legal and privacy barriers to social computing. We need further studies of basic signal models, reputation economies and models of governance. These are all difficult research domains that can now be

further studied by utilizing large-scale social participatory systems. These research issues are what make the design of social participation systems unique.

6. Infrastructure Proposal

To develop designers' and practitioners' knowledge of how to design systems that support social participation and to pursue the research agenda outlined above, we propose two key infrastructural and programmatic investments. The first, a **data depository**, will be responsible for accepting data sets, cataloging and archiving them, and making them available to qualified researchers. The second will be a **living laboratory**, where researchers and practitioners across communities will come together to study new and existing systems and communities.

Both the depository and living laboratory will serve as brokers across communities. Scientific studies have established that innovations and rewards are more likely to occur in certain niches in a social network of relations among people or enterprises. Those entities than span more tightly formed communities—those who are in brokerage positions between different-thinking groups—are more likely to see opportunities earlier and to reap the rewards of arbitrage. We see the Living Laboratory as a place to collaborate with various research groups that are emerging in this area, industrial research labs, technology developers, and different fields (e.g., microeconomics, social networks, network theory, cognitive modeling), and different startup businesses.

Data Depository

Many of the most important contributions in social computing to studies of technology mediated social participation have been made through careful analysis of data sets from large-scale existing systems. Sometimes these datasets are released publicly, other times researchers assemble them by scraping existing websites or APIs, and still other times access is negotiated on a case-by-case basis between individual researchers or research groups and companies.

Researchers very much want and need more of this data, as it can help researchers learn about behavior in real systems with millions of users, and these research findings have high external validity. Companies are not uniformly eager to release this data. Even companies that see potential benefits to releasing their data sets are not always able to do so. Netflix recently cancelled the successor to their Netflix Prize over fears that they were unable to adequately anonymize the data that the competitors would use. Furthermore, data that seems anonymous

today may be identifiable when paired with other future data or future resources and methods for de-anonymizing data.

The data depository would accept data sets from industry and other sources, and grant access to this data researchers with qualified study plans and appropriate human subjects approvals. Analysis of more sensitive data sets might be further restructured or only permitted on the depository's computing infrastructure. The depository will also organize courses on large-scale data analysis by experts in the field, for professors, students, and practitioners.

Precedents for such an organization, such as the Inter-University Consortium for Political and Social Research, which has been archiving and making social science data available for more than 40 years, offer some guidance about how it might be organized and what the budget might be. The depository will be a single site, with startup funding initially provided by the federal government. Over time, the site may either continue to be federally funded (the Library of Congress's recent acquisition of Twitter data may indicate that this is a priority) or be supported by dues from member institutions.

We further suggest that it is important to the researchers to work on real users in **live** systems, and not to work only on "dead data," in which the system is no longer evolving. The concept of "Living Laboratory," in which the understanding of social cognitive systems builds on top of a real, natural, and unconstrained environment. This involves a research platform on which a live community engaged in real tasks, and collective behavior may emerge out of the usage of the features of the system. This suggests a great need for academia to connect with the industry, and vice versa. We should build further bridges to large initiatives such as Wikipedia, and government efforts such as Data.gov.

Living Laboratory

In order to fully understand research issues around domains, techniques, and people, we propose to establish a research center focused on understanding how to design, build, and grow social participation systems. We propose to establish this research center to develop a platform for technology prototypes, live experiments, and scientific research. This platform will be a Living Laboratory for Social Participation.

This research center will be focused on understanding how to establish technical platforms for social computing innovations in a wide variety of domains (healthcare, open government, education, and innovation). It will

also be a platform for research and research collaborations, a place to exhibit research wares and attract user participation and a platform for voicing thought leadership. The Living Laboratory would be aimed at not only delivering social web technologies (applications, features, tools, etc.) but the Living Laboratory will itself be developed and operated in a social fashion.

Here are the main strategic goals of research center and the role envisioned for the Living Laboratory:

- Center of excellence. The research center must establish thought leadership in academia, business, and the public sector. Of course, traditional methods (e.g., publications; conference presentations) will continue to be pursued. However, the center must also obtain recognition and reputation with the Social Web research community using Web2.0 mechanisms. For instance, through blogs, tagging, Wikis, etc. The research center should establish itself as a center for reading about ideas about social participation design issues and system design, understanding examples of new techniques. This can take place via the Living Laboratory websites.

- Portfolio of high-value experiments. The goal is to create a self-sustaining model through a portfolio of live applications. The Living Laboratory will allow us to put prototype applications out on the Web, to get user feedback for rapid iterative improvement and attract interest from potential sponsors and partners. We will manage prototypes as a series of experiments with clearly understood ideas of solutions to important problems, milestone metrics to evaluate continued investment or abandonment, and desired end goals. One mantra we may very well experience is to "fail fast and fail often" in order to learn what works and what doesn't work.

- Deep science. Unlike startups and other shorter-term experiments, our advantage should be derived from our ability to do deep science. For example, this might include:

    - unique ability in developing techniques for extracting structures from social data based on models, developing models of interference costs and coordination costs through

theory-based predictions;
- unique capabilities in understanding expertise, social capital, and social network models;
- unique insight in how to reduce user friction in social participation systems.
- the opportunity to observe and evaluate different design methods across time and a variety of communities.

One consequence of this simple Living Laboratory model is a **focus on impact and not just demos**. It implies that whatever gets developed must be usable---systems that make individuals better, and/or systems that make collective better. This means that evaluations need to be applied often and iteratively throughout the process. It also means that a substantial focus of the research needs to be on engineering the user interfaces and back-ends to be reasonably robust and scalable.

The Living Laboratory is envisioned to be a ***multi-disciplinary, multi-sector, and internationally*** collaborative socio-technical environment and will create a *strong synergy* among academia, industry, distributed scientific communities, and the public. It will develop frameworks in specific application contexts that will be applicable to *numerous domains* for which social creativity and collaborative design are important. The Living Laboratory will support the ***education*** of a *new generation of scholars* encouraged, supported, and exposed to social media and motivated to engage in social participation. Members of the Living Lab community will coordinate with other researchers to understand how new theories and models of social media and participation that might give rise to unique analysis methods and algorithms.

Engagement Plan

We propose a program with a variety of engagement points to support collaborations across research communities:

First, the Living Laboratory or Laboratories will be collocated with one or more institutions that are recognized as leaders in the field of TMSP, preferably in both regions which have a high concentration of private and public sector companies and organizations working in this space and possibly regions that are experiencing economic hardships and transitions. In these laboratories, researchers and practitioners will come together to design and implement research studies on existing technical systems as

well as grow new ones from the ground up. These new systems will include systems to be developed specifically as large, ongoing research platforms (e.g., the successful MovieLens project) and systems that are built with both research and commercial goals, but unlike traditional startups, designed and implemented from the beginning to facilitate research. A fellows program will support practitioners who wish to rotate from industry to the lab to learn how to better design and analyze their own communities.

We believe that it is important for the center to exist in proximity to good partners in industry and academia. There may be one or more centers. Different funding models are possible: the centers might be entirely federally funded, funded by a mixture of academia and industry, or full partner ships between the different stakeholders.

Second, we propose a program of embedded, roving researchers who will spend time in organizations that are not collocated with the Living Laboratories. These fellows will work with companies and other organizations designing systems for social participation to learn from the real-world communities. They will include graduate students and academics on sabbatical or other leaves. A portion of their stipends will be funded under the National Initiative for Technology Mediated Social Particiation, with the requirement that all work resulting from the fellowship be published or otherwise made publicly available.

7. Conclusion

This is the "decade of social media." We have now gotten a taste of how mass-scale participation in social computing systems results in dramatic changes in the way science, government, healthcare, entertainment, and enterprises operate. There is an unprecedented opportunity before us to organize designers of social participation systems to really build up the science, models, techniques, and evaluations of social participatory systems. Our overall recommendation is three-fold:

First, we propose to explore unique design principles relating to three different areas: (1) the understanding of what domains and contexts might benefit from mass social participation; (2) the exploration of components, tools, and techniques for social participation; and (3) the mapping of

factors that affect users, groups, and communities.

Second, we propose to study and develop the suite of methods for designing systems for social participation. We must have better understanding of the overall architecture and model of social participation. This includes the understanding of existing users and communities and their goals and aspirations, but also the understanding of how they interact with social computing techniques such as recommendation engines, visual analytics, and social voting systems. We must further explore the interaction between users and communities with human and machine intelligence techniques. This will be enabled through close collaboration between researchers and practitioners during the development and evolution of systems at the Living Laboratory.

Finally, we propose to create a both a depository for data sets from real-world sociotechnical systems and a living laboratory to focus on studies of live platforms of social participation systems across many contexts. We seek to engage with industry, startup companies, as well as domains such as open government, social healthcare and education.

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