Extended Abstract for a Panel Submission to CHI'2009

Creativity Challenges and Opportunities in Social Computing

PANEL ORGANIZER:

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INVITED PANEL PARTICIPANTS (ALL CONFIRMED):

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Creativity and Social Computing

There is a convergence in recent *theories of creativity* that go beyond characteristics and cognitive processes of individuals to recognize the importance of the social construction of creativity. In parallel, there has been a rise in *social computing* (based on social production and mass collaboration and facilitated by new technological developments such as the cyberinfrastructure and Web 2.0 architectures) supporting the collaborative construction of knowledge and exemplified by examples such as open source software, wikis, blogs, multi-player games, warehouses, etc.

The panel will discuss the challenges and opportunities from the confluence of these two developments by bringing together the contrasting and controversial perspective of the individual panel members. It will synthesize from different perspectives an analytic framework to understand these new developments, and how to promote rigorous research methods and how to identify the unique challenges in developing evaluation and assessment methods for creativity research

Specific Controversial Topics

The panel will explore the following controversial topics:

- most of the pressing and important problems of today's world are systemic problems making collaboration supported by social computing not a luxury but a necessity
- will social computing *enhance* or *hinder* creativity? by contrasting the arguments:
  - enhancements will come from making all voices heard, integrating local knowledge and unique expertise and critiquing each other thoughts and products;
  - hindrance will be caused by problematic impacts and potential drawbacks of social computing such as: (1) the suffocation of authentic voices by mass mediocrity; (2) counter-productive fragmentations among participants based on too many different voices from the Long Tail leading to modern versions of the "Tower of Babel";
- how can we nurture collaborations across disciplines of research and practices, particularly those historically viewed as disparate from each other (e.g.: CS/HCI and the Creative Practices?)?
- does the integration of creative practices in research only require new production techniques, or does it necessitate new ways of thinking, questioning and processing information thereby requiring not only new technologies, but new mindsets.
- how can we exploit the creative arts practices that have been engaged in a rich history of critical thinking to envision new HCI methods and techniques:
- how can we sow the seeds for a more creative society by educating students as creative thinkers and creating mindsets focused on:
  - regarding collaboration in social computing environments as desirable and engaging instead of considering it a form of cheating;
  - not only solving specific types of problems, but being able to adapt and improvise in response to the unexpected situations that inevitably arise in today's fast-changing world.

- how will creativity research support the emergence of new intellectual cultures between HCI and digital arts?
- how do communities and technologies co-evolve in social computing environments in the pursuit of creativity?
- what is the impact of powerful creativity support tools supporting collaboration, visualization, reflection, and critiquing?

A Timely Topic
As argued above: new *theories of creativity* focused on the social construction of creativity have been appearing as the same time as social computing has emerged as a powerful new paradigm for interaction and collaboration.

To increase the awareness of the HCI community at large (rather than being restricted to a small sub community) of these developments and being confronted with opportunities and challenges will be a major contribution of the panel. The panel members have been actively involved in the following workshops (mostly supported by the NSF CreativeIT Program) and will be able to contribute the insights gained to the panel:

- Workshop on "Creativity Support Tools", Sponsored by the National Science Foundation, June 13-14, 2005, Washington, DC
- Workshop on "Synergies Between Creativity and Information Technology, Science, Engineering, and Design: Defining a Research Emphasis", November 2 and 3, 2006, Arlington, Virginia
- Workshop on "Success factors in fostering creativity in IT research and education", January 18-20, 2008, Arizona State University, Tempe, AZ
- International Workshop on "Studying Design Creativity'08: Design Science, Computer Science, Cognitive Science and Neuroscience Approaches: The State-of-the-Art", 10-11 March 2008, Aix-en-Provence, France

- Workshop on "Creativity and Rationale in Software Design", 15-17 June 2008, Penn State University

Synthesizing Unique Perspectives and Background Knowledge:
While the panel has a shared focus defined by its title *"Creativity Challenges and Opportunities in Social Computing"*, the participants of the panel have been selected to bring contrasting and complementary expertise to the panel based on their unique expertise:

- ***Gerhard Fischer*** has done research in the following areas relevant to the theme of the panel: (1) understanding, exploring and assessing the integration of individual and social creativity; (2) supporting not only reflective practitioners, but reflective communities; (3) creating collaborative computing environments supporting face-to-face interaction with table-top computing; and (4) developing computational mechanisms to support reflection-in-action and reflection-on-action with critiquing;

- **Pamela Jennings** has done research in the following areas relevant to the theme of the panel: (1) exploiting the mutual benefit of the encounter between HCI and the creative practices; (2) developing ICT systems that bridge research methods from HCI and engineering to Digital Media; (3) engagement in policy development in support of resources for creative technology research activities.

- **Mary Lou Maher** has done research in the following areas relevant to the theme of the panel: (1) development of computational models of creativity that are inspired by cognitive models of creativity and curiosity; (2) comparison of multi-modal and immersive interfaces to digital models for their impact on creative design cognition. In addition to her own research activities, she is the program director of the NSF CISE program "CreativeIT". She has been responsible defining the program and in her position as program director has a broad overview and understanding of research activities in "Creativity and IT".

- **Mitchel Resnick** has done research in the following areas relevant to the theme of the panel: (1) he is the founder of the Computer Clubhouse movement which has explored social computing in unique settings; (2) he is the developer of the *Scratch Computing environment* which has 160,000 registered participants from around the world and developed repositories in which the participants can share their creations;

- **Ben Shneiderman** has done research in the following areas relevant to the theme of the panel: (1) he has developed in his book "Leonardo's Laptop" an agenda for the new computing focused on creativity and collaboration; (2) he has pioneered the development of visualization tools supporting creativity and is defining a set of HCI principles for facilitating visual discovery.

Session Proposal

The main topic(s) to be presented, debated, discussed, enacted

- recent *theories of creativity* that go beyond characteristics and cognitive processes of individuals to recognize the importance of the social construction of creativity

- analysis and rise in *social computing* (based on social production and mass collaboration and facilitated by new technological developments such as the cyberinfrastructure and Web 2.0 architectures) supporting the collaborative construction of knowledge and exemplified by examples such as open source software, wikis, blogs, multi-player games, warehouses

- the confluence of creativity and social computing and the resulting challenges and opportunities for innovative HCI research

- the tensions and synergistic effect between individual and social creativity

- experience reports and critical analysis of existing social-technical environments (under further development) including Scratch, CreativeIT Wiki,

Who will participate

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How the Panelists have been recruited

- the five panelists have been interacting with each other for many years in the context of workshops, conference, and research projects to explore research issues related to: HCI, creativity, creative practices, design, social computing, and educational technology

- an important recruitment consideration was to bring complementary views, background knowledge, and roles in the research environment (e.g.: researchers at Universities, program director from NSF, and research manager from an new media institute to the panel)

Why these people, what qualifications do they bring

Remark: more detailed descriptions of the panelists background are provided below!

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focused on creativity and collaboration; (2) he has pioneered the development of visualization tools supporting creativity and is defining a set of HCI principles for facilitating visual discovery.

Session Format
The panel will be structured as follows:

- Opening statements by panel members focused on:
  - brief (approx 6-9 min each → 30-45 minutes total; leaving 45-60 minutes for discussion)
  - raising controversial issues
  - articulating hypotheses and questions for audience participation
- Audience participation as described below
- Closing remarks

Audience participation will be critical in provoking discussion about the different perspectives and associated priorities that are expressed by panel members. Questions will be carefully prepared in order to elicit audience's response, pay attention in their concerns and experiences with creativity and social computing in relation to their own work.

In order to achieve *maximal audience participation*, we will set a social computing environment during the panel supporting as many as possible of the following enhancements for participation:

- a *chat window* that people from the audience (or possibly even people that are not able to attend) can carry on a parallel conversation to the panel discussion;

- we will periodically generate *a tag cloud* to visualize the main topics of the chat and the visualization will be displayed so that the panelists can observe the content of the chat at a glance;

- we will set up a *wiki page* in the CreativeIT Wiki (http://swiki.cs.colorado.edu/CreativeIT) and open that during the panel so that the audience (and people not attending) can collectively edit their answers to and comments on the same issues that the panelists are responding to;

- this *wiki page will be moderated and made visible* to the panelists so they can respond to a broader range of questions and issues than is possible through "talking" with the audience and each other; and

- we will create a *shared mind map* that people in the audience can collectively characterize their interpretation of the panel discussion as a set of related concepts.

Logistics we need to consider to host the session

- **special seating**   none

- **A/V:** To support and achieve the audience participation described above, we will need wireless in the panel meeting room and we will encourage people to bring their laptops. With the help of the conference organizers, we will set up the environments ahead of the time (and we will trial their use before the panel meets). We will need additional projectors in the room so that the tag cloud, wiki, and mind map can be displayed in addition to the slide presentation of the person presenting or speaking.

- **audience size limitations:**   none

- **use of student volunteers**:   yes: we need support to set up and monitor the audience participation as described above

- **expectations about attendee background or interests**: HCI researchers and practitioners who have an interest in creativity and social computing and in the HCI opportunities, challenges, principles, and techniques which can be derived from these themes

Other considerations that will help reviewers appreciate your concept

- a timely topic (as argued above)

- it will be a follow-up activity inspired by the highly successful session at CHI 2008 consisting of a talk by Greenberg and Buxton entitled *"Usability Evaluation Considered Harmful: Some of the time"* followed by a very interesting panel discussion with audience participation

Elaborated Statements from Panelists

GERHARD FISCHER (CU BOULDER): INTEGRATING INDIVIDUAL AND SOCIAL CREATIVITY

The power of the unaided individual mind is highly overrated. Although society often thinks of creative individuals as working in isolation, intelligence and creativity result in large part from interaction and collaboration with other individuals. Much human creativity is social, arising from activities that take place in a context in which interaction with other people and the artifacts that embody collective knowledge are essential contributors. This contribution will explore: (1) how individual and social creativity can be integrated by means of proper collaboration models and tools supporting distributed intelligence; (2) how the creation of shareable externalizations ("boundary objects") and the adoption of evolutionary process models can enhance creativity and support emerging design activities; and (3) how new design competencies can be acquired that require passage from individual creative actions to synergetic activities, from reflective practitioners to reflective communities, and from given tasks to personally meaningful activities. My contribution will be focused on the following topics:

Trade-offs as the most basic characteristics in design. There are no best solutions independent of goals and objectives. *Trade-offs* are often characterized and conceptualized as binary choices. Binary choices represent the endpoints of a spectrum (each of them providing important perspectives within their own discourses). Exploring the

middle ground between these endpoints, however, will help one to gain a deeper understanding of what stifles and hinders versus stimulates and enhances creativity. Identifying "sweet spots" as a combination of factors allowing for a particular suitable solution in a specific context and synergizing the best of the different approaches will enhance further progress.

Individual Creativity. Creative individuals, such as movie directors, leaders of sports teams, and leading scientists and politicians, can make a huge difference in exemplary cases. Individual creativity is grounded in the unique perspective that the individual brings to bear in the current problem or situation. It is the result of the life experience, culture, education, and background knowledge of the individual, as well as the individual's personal interest associated with a particular situation. Individual creativity, however, has limits. In today's society, the Leonardesque aspiration to have people who are competent in all of science has to fail because the individual human mind is limited.

Social Creativity. Creative activity grows out of the relationship between an individual and the world of his or her work, as well as from the ties between an individual and other human beings. Much human creativity arises from activities that take place in a social context in 5 which interaction with other people and the artifacts that embody group knowledge are important contributors to the process. Creativity happens not inside a person's head, but in the interaction between a person's thoughts and a socio-cultural context (e.g., as illustrated by the work of Csikszentmihalyi).

PAMELA JENNINGS
Critical Creative Technology is a framework for the design of information technologies and creative practices (ITCP) that promote presence, engagement and action among the people in publically shared spaces. My research interests and practices initiate from basic observations and inquiries about the impact of technology on the human condition. These inquiries are the driving force to the

development of new creative and thought provoking ways to interact with technology in our everyday lives. This includes the exploration of new frameworks for creating, sharing and learning with emphasis on inter-cultural exchange and experiences that encourage shifts in perception of the self and the everyday lived world. Examples of such research projects include the "Constructed Narratives Construction Kit" and classroom exercises such as the "urban nomad" and "worn identity".   The goal is the development of intelligent, responsive, environments that can be embedded into the fabric of everyday life as an interface between the public and private sphere, the built environment and emergent human behaviors.

Nurturing collaborations across disciplines of research and practices, particularly those historically viewed as disparate from each other, is a critical process for fostering an environment for open exploration, creativity, scholarship and training. The unique gift of integrating creative practices with technology development is the emergence of new perspectives, practices, ideas, and innovations. Integrating the creative practices in research is not only about adopting a production technique, but also adopting a way of thinking, questioning and processing information. In the creative arts critical thinking is one such form of intellectual production. Critical thinking refers to a rigor in research that includes the ability to understand and problem solve, integrate multi-domain knowledge in new ways. Understanding historical and contemporary practices to support multiple perspectives enables one to articulate known and new discourses and understand their implications on society. With these skills critical thinkers are able to develop new ideas from the foundations of old, understand the political and social implications of media development, and learn the skills to transform ideas of critical thinkers into the actions of critical makers. The creative arts practices engage a rich history of critical thinking that stems from deep reflection on critical theory, philosophy, and the impact on contemporary culture. Whereas, traditional HCI methods lack, and to some degree avoid, critical theory as a means to understand the impact of technology on culture and society, it has a rich history of methodologies that can lead to the development of

innovative technologies. The question then is how to unite the two paradigms of cultural engagement, critical and pragmatic, to produce a research environment that is influenced by critical thinking transformed into critical making. Resulting in an environment of innovation – a playground of ideas and making where the rigor of research methods encapsulate but do not strangulate learning and innovation.

MARY LOU MAHER (NSF):
Computers provide an interactive environment for externalizing our ideas and problem solving processes. The way in which we interact with this external representation has an impact on our cognitive behavior. For example, a study of designers using traditional HCI devices such as a keyboard and mouse focus on processes and products that are less likely to produce creative designs than designers using tangible interfaces to the same digital models. If the "tools" that we use impact our focus and cognitive behavior, how can we use models of creative cognition to rethink HCI so that creativity is enhanced rather than stifled?

This question can be extended to consider the potential for social computing environments to enhance creativity by critically assessing how we externalize information in these environments in ways that encourage or stifle creativity. In social computing, we interact not only with externalized information and models but also with potentially large numbers of other people. The tradition of HCI in focusing on how people interact with computers is being revolutionized by the phenomena in which many people interact with many computational systems, where the system may act as mediator, resource, or mentor. How can cognitive models and theories of creativity inform the future of social computing so that creativity is encouraged and enhanced? Can creativity as a social construction provide a model for social computing so that creativity is recognized and rewarded?

MITCHEL RESNICK (MIT MEDIA LABORATORY): SOWING THE SEEDS FOR A MORE CREATIVE SOCIETY
In the 1980s, there was much talk about the transition from the Industrial Society to the Information Society. Then, in the 1990s, people began to talk about the Knowledge Society, noting that information is useful only when it is transformed into knowledge.

But, as I see it, knowledge alone is not enough. In today's rapidly-changing world, people must continually come up with creative solutions to unexpected problems. Success is based not only on what you know or how much we know, but on your ability to think and act creatively. In short, we are now living in the Creative Society.

Unfortunately, few of today's classrooms focus on helping students develop as creative thinkers. Even students who perform well in school are often unprepared for the challenges that they encounter after graduation, in their work lives as well as their personal lives. Many students learn to solve specific types of problems, but they are unable to adapt and improvise in response to the unexpected situations that inevitably arise in today's fast-changing world.

New technologies play a dual role in the Creative Society. On one hand, the proliferation of new technologies is quickening the pace of change, accentuating the need for creative thinking in all aspects of people's lives. On the other hand, new technologies have the potential, if properly designed and used, to help people develop as creative thinkers, so that they are better prepared for life in the Creative Society.

How can new technologies help students develop as creative thinkers? By engaging them in what I call the *"creative thinking spiral."* In this process, people *imagine* what they want to do, *create* a project based on their ideas, *play* with their creations, *share* their ideas and creations with others, *reflect* on their experiences – all of which leads them to *imagine* new ideas and new projects. As students go through this process, over and over, they learn to develop their own ideas, try

them out, test the boundaries, experiment with alternatives, get input from others, and generate new ideas based on their experiences.
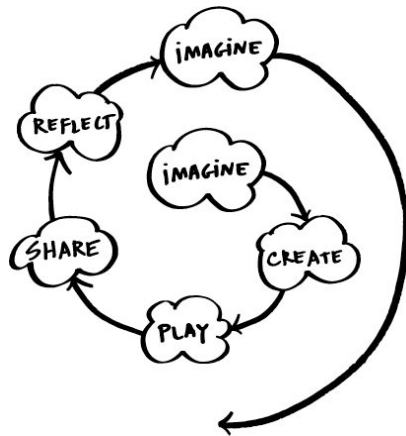
In my presentation, I will focus especially on a new software environment, called Scratch, that we designed specifically to engage students in the creative thinking spiral. With Scratch, students (ages 8 and up) can create their own interactive stories, games, and animations – and share their creations on the web. Since our group at the MIT Media Lab launched Scratch in May 2007, more than 200,000 interactive projects have been shared on the Scratch website (http://scratch.mit.edu). More than 15% of these projects are remixes, meaning that young people modified and extended projects contributed by others. As young people create and share interactive projects in Scratch, they learn to design creatively, think systematically, and work collaboratively – and, more generally, develop as creative thinkers.

BEN SHNEIDERMAN, (UNIVERSITY OF MARYLAND): FACILITATING VISUAL DISCOVERY IN SOCIAL NETWORKS
It is satisfying that the Visual Information Seeking Mantra, proposed in 1996, has caught on so strongly. It's arc of action goes from

"Overview first" to "zoom and filter" and finally to "details-on-demand." This compact phrasing captures the importance of getting oriented by seeing the big picture. Then the central role for users is to decide where to zoom and how to filter, before clicking to get the details. By now the literature has come to include refinements and variations on this mantra as well as appropriate complaints about its vagueness, incompleteness, and lack of validation. The task of visualizing social networks is a substantial challenge because the current layout algorithms often present tangled networks with crossing links, occluded nodes, and unreadable labels. The idea of Network Nirvana has four goals for designers: make all nodes visible, enable users to count degree for every node, allow users to follow every link from source to destination, and show meaningful clusters.

Replacing the often chaotic layout of force-directed algorithms with meaningful spatial substrates may enable users to make insights about their data. Of course user control over visual properties such as size, color, and shape is just as important as zooming and filtering.

These principles are only a starting point. They need clarification, expansion, and validation. Demonstrations of these principles will be shown.