Supporting Social Creativity: Promises and Pitfalls

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ABSTRACT

In our research we are developing and assessing conceptual and technological frameworks for understanding, supporting, and enhancing social creativity by democratizing design. We exploit the opportunities and explore the challenges of the fundamental transformational shift from an industrialized information economy (specialized in producing finished goods to be consumed passively) to a networked information economy (in which all people are provided with the means to participate actively in addressing personally meaningful problems).

This paper describes success factors as *pitfalls* and *promises* derived from three application areas (collaborative design environments, course information environments, and Wikis) that we have explored over the last few years.

Keywords

social creativity, socio-technical environments, Envisionment and Discovery Collaboratory, course information environments, CreativeIT Wiki

1 INTRODUCTION

Although the creative act is often seen as the result of an individual working in isolation [Sternberg, 1999], the role of interaction and collaboration with other individuals is critical. The idea of *social creativity* [Fischer et al., 2005] emphasizes the belief that the heart of creativity is not the individual human mind, but groups of minds in interaction with each other and in interaction with materials, tools, and artifacts.

Creativity and innovation are being *democratized* [von Hippel, 2005]: users of products and services are increasingly able to create and innovate for themselves. To put owners of problems in charge, we have developed *meta-design* [Fischer & Giaccardi, 2006] as a new design methodology. The methodology and its supporting substrates are focused on an approach to design that does not get rid of the emergent, but rather includes it and makes it an opportunity for more creative and more adequate solutions to problems.

Although new tools are *necessary* to support meta-design, tools per se are *not sufficient* to democratize design and support social creativity. Access to these tools is a first step, but *socio-technical environments* are required that allow people to acquire the *technical knowledge*, reinforce *social skills and* provide the *context* necessary to use and adapt such tools to their needs.

In this paper, we first summarize some of the rationale for socio-technical environments to unleash social creativity by expanding boundaries and redistributing control in design (Section 2) and then describe three application domains (Section 3) that we have explored in our research over the last few years. From an analysis of these applications and other research efforts, we identify pitfalls and promises for fostering creativity. We conclude by proposing some actions derived from our analysis and from the discussion among all participants during the workshop (Section 6).

2 THE OPPORTUNITY: UNLEASHING SOCIAL CREATIVITY WITH SOCIO-TECHNICAL ENVIRONMENTS

Socio-technical environments [Mumford, 1987; Trist, 1981] have the potential to unleash social creativity by integrating computing infrastructures and participative processes supporting collaboration not only about design artifacts but also about the goals of the design activity. By allowing users to be designers, socio-technical environments offer the possibility to achieve the best fit between systems and their ever-changing context of use, problems, domains, users, and communities of users. They empower users, as owners of a problem, to engage actively and collaboratively in the continual development of systems capable of sustaining personally meaningful activities and coping with their emergent needs. Socio-technical environments evolve as a result of a flexible and collaborative development process, which in turn modifies the terms of participation itself.

The rationale for creating socio-technical environments as a means to unleash social creativity by *expanding boundaries and redistributing control in design* comes from many sources, including the following prescriptive objectives and empirical observations:

- *"The experience of having participated in a problem makes a difference to those who are affected by the solution. People are more likely to like a solution if they have been involved in its generation; even though it might not make sense otherwise"* [Rittel, 1984].
- *"I believe passionately in the idea that people should design buildings for themselves. In other words, not only that they should be involved in the buildings that are for them but that they should actually help design them"* [Alexander, 1984].

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- *"We have only scratched the surface of what would be possible if end users could freely program their own applications. As has been shown time and again, no matter how much designers and programmers try to anticipate and provide for what users will need, the effort always falls short because it is impossible to know in advance what may be needed. End users should have the ability to create customizations, extensions, and applications"* [Nardi, 1993].
- *"The hacker culture and its successes pose by example some fundamental questions about human motivation, the organization of work, the future of professionalism, and the shape of the firm"* [Raymond & Young, 2001].
- *"Users that innovate can develop exactly what they want, rather than relying on manufacturers to act as their (often very imperfect) agents"* [von Hippel, 2005].
- *"In the digital world, many of the distinctions between designers and users are becoming blurred. We are all, to some extent, designers now"* [Brown & Duguid, 2000a].
- *"The networked environment makes possible a new modality of organizing production: radically decentralized, collaborative, and nonproprietary"* [Benkler, 2006].
- *"The opportunity to generate vibrant customer ecosystems where users help advance, implement, and even market new product features represents a largely untapped frontier for farsighted companies to exploit"* [Tapscott & Williams, 2006].

The technological foundations to make these objectives a reality are provided by a powerful infrastructure for collaborative efforts. The Internet allows people to share their efforts, and the increased digital fluency [National-Research-Council, 1999] of the population in general, will make owners of problems independent of "high-tech scribes' in personally meaningful tasks [Fischer, 2002]. Emerging success models, such as open source software and Wikipedia, have provided evidence of the great potential of socio-technical environments in which users can be active contributors.

3 APPLICATIONS

In this section, we will describe three application domains that we have explored for several years in our research to gain a deeper understanding of creativity, specifically social creativity. These domains were chosen because we are familiar with them and because they are focused on different aspects of social creativity. The first domain, the *Envisionment and Discovery Collaboratory*, brings different stakeholders together around a computationally enhanced table to discuss, design, and assess problems and decision making in urban planning. All stakeholders contribute to the creation of one complex artifact. The second domain investigates *course information environments* to study approaches in education allowing students not only to be passive consumers, but active contributors by making creative extensions to a seeded environment. The third domain explores new generation *wikis for supporting the research community in Creativity and IT*. The unique challenges of this specific distributed scientific community are that people working in interdisciplinary projects or in niches of their disciplines are often isolated in their local environment and not aware of relevant work in other disciplines. The wiki complements face-to-face meetings (such as the ASU workshop and others) and it serves as a living organizational memory to create and sustain the community working in this topic area.

Application-1: The Envisionment and Discovery Collaboratory (EDC)

The EDC [Arias et al., 2000] supports social creativity by creating shared understanding among various stakeholders, contextualizing information to the task at hand, and creating objects-to-think-with in collaborative design activities. It is applicable to various domains; our initial effort has focused on the domains of urban planning and decision making, specifically in transportation planning and community development. Creating shared understanding requires a culture in which stakeholders see themselves as reflective practitioners rather than all-knowing experts [Schön, 1983]. Collaborative design taking place in such a culture can be characterized by a "symmetry of ignorance" [Rittel, 1984]: even though each stakeholder possess relevant knowledge, none of them has all the relevant knowledge, as well as "asymmetries of knowledge"; and [Arias, 2007]: expertise is context dependent and in specific situations different knowledge is more relevant to the task at hand.

The EDC transcends the "single user/single computer" interaction model. Crucial processes supported by the EDC that can be considered as *success factors* for social creativity are:

- dealing with a set of *possible worlds effectively* (i.e., exploring design alternatives) to account for the design is an argumentative process where we do not prove a point but we create an environment for a design dialog [Simon, 1996];
- using the *symmetry of ignorance* as a source of power for mutual learning by providing all stakeholders with means to express their ideas and their concerns [Rittel, 1984];
- *activating appropriate knowledge* as it becomes relevant, from both the stakeholders' asymmetries of knowledge [Arias, 2007] and rich external repositories;
- incorporating an emerging design in a set of external memory structures, and recording the design process and the *design rationale* [Fischer et al., 1996];
- *creating low-cost modifiable models* help stakeholders to create shared understanding, have a conversation with the materials of the design activity [Schön, 1983], and replace anticipation (of the consequences of our assumptions) by analysis; the low-cost modifiable models can be *incrementally refined* [Shipman, 1993] by replacing them in later stages of the design process with models from the 3D Warehouse (see Figure 1);
- using the domain orientation to bring tasks to the forefront and support *human problem-domain communication* [Fischer, 1994];
- increasing the "back-talk" of the artifacts with *critics* [Fischer et al., 1998]; and
- using simulations to engage in *"what-if" games* [Waddell et al., 2003].

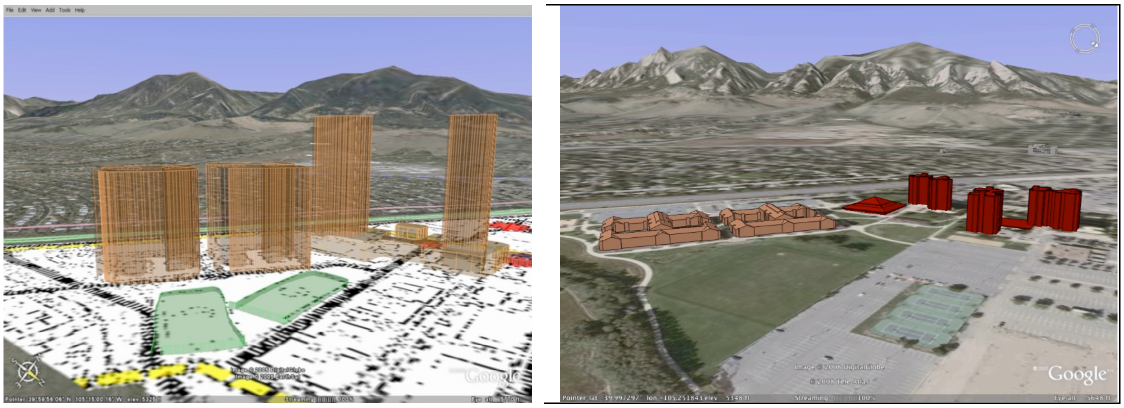

Figure 1: Incremental Refinement and Formalization in Design

The left pane shows very crude sketches of new building created with a minimal effort to explore height limitations. The right pane shows versions based on the crude images that are refined to resemble more closely the buildings that will be eventually constructed by taking advantage of existing models from the 3D Warehouse

The EDC has allowed exploration of individual and social creativity through interaction and participation across a variety of different dimensions:

- **Individual interaction with computational artifacts *versus* shared interaction, supporting interaction with others through the computational artifacts as a shared medium.** Many approaches to computational support for collaborative activities have focused on the network as the shared medium and the individuals' interactions through that medium via their individual computational devices. The EDC attempts to extend this model to explore how shared interaction with the computational models within the same physical space [Olson & Olson, 2001] can provide ways to tap into elements of social interaction that occur naturally in such shared spaces.
- **Individual agendas *versus* creation of shared focus.** One aspect that often confronts attempts to create common ground is that the perspectives that participants bring to the meeting may be closely tied with (sometimes implicit) agendas. Often the format of the interaction reinforces these agendas rather than moderate among them. Experiments with physical models as a means of focusing discussion around the shared problem have demonstrated that a common focus helped to create a better appreciation of other perspectives. The EDC builds upon this model for interaction and includes support for dynamic computational models as part of the interaction as well as for dynamic linkages to information relevant to the task at hand [Fischer et al., 1996].
- **Expert tools *versus* providing access to design for people with different perspectives and from various backgrounds.** A critical element in the design of the EDC is the support for participation by individuals whose valuable perspectives are related to their embedded experiences (e.g., neighborhood residents) rather than on any domain expertise. The overall design of the EDC, targeted toward these participants, employs the use of physical objects to create an inviting and natural interaction with the simulation, and recognizes that parallel interaction capability is essential to support this natural interaction [Eden, 2002]. The development of active critics [Fischer et al., 1998] and virtual stakeholders [Arias et al., 1997] supports informed participation.
- **Dependence on model monopolies *versus* creating boundary objects.** One danger of any model (computational or otherwise) is that it may embody certain assumptions and perspectives that, if not questioned, can lead to an imbalance of influence within the process. These forms of *model monopoly* [Turkle & Papert, 1991] need to be balanced by having open representations of the models that allow for deeper understanding, experimentation, and possibly refutation. The goal is to permit a migration toward shared representations that are useful across contexts as boundary objects [Bowker & Star, 2000]. The EDC design goals are to provide an open environment and design process that will allow these models to be developed and extended.
- **Reliance on high-tech scribes *versus* supporting meta-design.** Creating models within the EDC requires a considerable amount of programming effort. This represents a high degree of reliance upon high-tech scribes, distancing the real designers from the medium of expression. Environments (even domain-oriented ones) that are open and easily modifiable and extensible are still elusive. While we continue to work on support for end-user development [Fischer et al., 2004] we are also looking at ways to harness existing tool use, integrate with existing practice, develop models (such as open source systems [Raymond & Young, 2001]), and empower local developers [Nardi, 1993].

Application-2: Course Information Environments

Courses-as-seeds [dePaula et al., 2001] is an educational model that explores meta-design and social creativity in the context of fundamentally changing the nature of courses taught in universities. Its goal is to create a culture of informed participation [Fischer & Ostwald, 2005] that is situated in the context of university courses transcending the temporal boundaries of semester-based classes, for examples see: http://l3d.cs.colorado.edu/~gerhard/courses. Traditionally, the resources provided by instructors (such as lectures, readings, and assignments) define the entire content of a course. By involving students as active contributors, courses do not have to rely only on the intellectual capital provided by the instructors. Courses are conceptualized based on the *Seeding, Evolutionary Growth, and Reseeding* model [Fischer et al., 2001], in which the instructor provides the initial seed rather than a finished product [Rogoff et al., 1998], thus, allowing students to explore more personally meaningful aspects of the subject matter.

Application-3: Supporting Social Creativity with Next Generation Wikis

Conventional wikis have proven to be usable and useful to support communities, but one of their main limitations as they are applied to research in creativity and IT is their *lack of support for different media types.* A consequence of this limitation is that communities (particularly those not focused on text) have only limited means to describe the research contributions. In our NSF-supported research project (http://swiki.cs.colorado.edu/NGW) we are exploring the following factors in understanding and designing new wikis that can be used to support social creativity:

- Wikis have always had the goal of being open, simple, and "low-threshold" environments—a ***potential success factor*** would be: to increase the expressiveness (the high ceiling) required for creative activities in a wiki while retaining the low threshold;
- Most wikis has been used as content management systems in which individual contributions are accumulated—***a potential success factor*** would be the increased support for dialogue, interpretation, and interactions;
- Current wikis present only the current versions of content, and minority opinions are often lost in the rewriting of wiki items—a ***potential success factor*** would be: to make minority voices heard to avoid the pitfall of average mediocre products and ideas;
- Most wikis reflect the current consensus of all users, but the dialogue that produced this consensus is lost and has to be reconstructed by users—a ***potential success factor*** would be to have mechanisms to illustrate historical change so that users can view how the dialogue has developed.

These requirements, their implementation, and their assessment will be analyzed in specific socio-technical environments evolved by user-generated content (including: the CreativeIT Wiki (http://swiki.cs.colorado.edu/CreativeIT) and 3D Warehouse (http://sketchup.google.com/3dwarehouse).

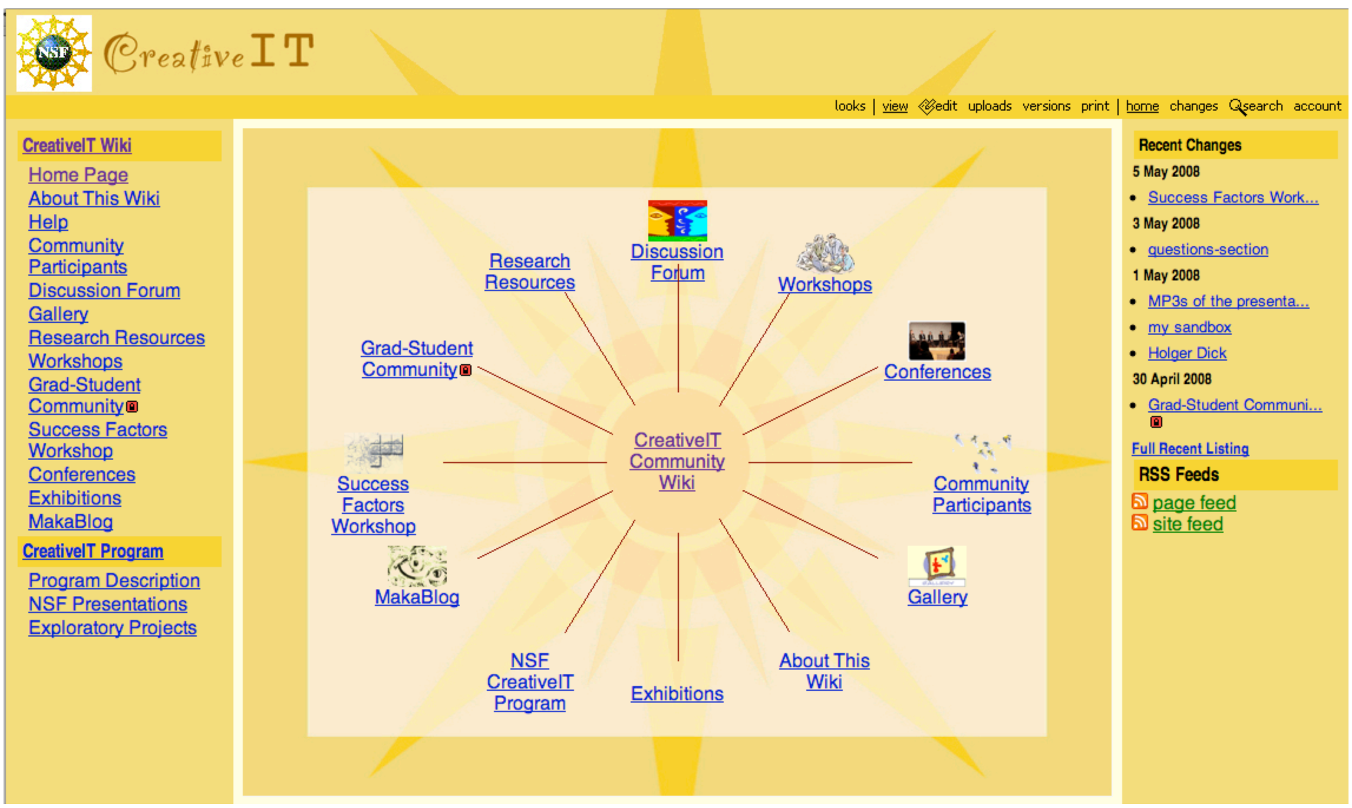

Figure 2: The top-level Interface of the CreativeIT Wiki

4 PITFALLS AND PROMISES

Whereas success factors can tell us a great deal, looking at them alone is only attending to part of the evidence. We can learn from failures, especially by seeing failures as more than just the absence of success factors. Even in the presence of success factors there may be other elements that result in other than desired outcomes. Our analyses and experiences have revealed concerns that represent possible *pitfalls* as well as opportunities that show *promise*.

Pitfalls (PFs)

"We make progress if, and only if, we are prepared to learn from our mistakes." (Karl Popper)

PF-1: Ignoring Motivation

For social creativity to succeed, the following questions need to be answered: (1) from an individual perspective: *"Am I interested enough and am I willing to make the additional effort and time so my voice is heard*?" and (2) from a social perspective: *"How can we encourage individuals to contribute to the good and progress of all of us?"* These questions indicate the importance of motivation and rewards in persuading people to make their voices heard creating the following objectives:

- Making changes must seem possible for the skill and experience level of specific users.
- Changes must be technically possible (a central objective of our meta-design approach).
- Benefits must be perceived; e.g., individuals must perceive a direct benefit in contributing that is large enough to outweigh the effort.
- The effort required to contribute must be minimal so that it will not interfere with getting the real work done.

PF-2: Build it and they do not come

Often the allure of new technologies, the desire to replicate successful exemplars, or genuine hope of making a difference can result in the creation of systems that fall short of being "fields of dreams." This is not to say that such systems should not be explored and attempted (certainly if we do not build it they will not come either). But a more realistic and careful look at issues such as those described in this paper are necessary to build where the need is. For example, Robert Stephen's experience (described in [Tapscott & Williams, 2006]) in trying to build a Wiki environment to support his *Geek Squad* only to find that his agents had already self-organized around the Battleground 2 online game:

> *"Instead of trying to set the agenda," he said, "I'm now going to try to discover their agenda, and serve it"*

In the context of the CreativeIT Wiki, we have been exploring the following issues:

- What are the true needs of the CreativeIT community? Are we missing key opportunities for social designs in bringing individuals together? Are we building the "right" technology for the wrong tasks? Are we building the "wrong" technology for the most pressing needs? Is the technological support overkill, insufficient, or appropriate?
- Does the activity in the CreativeIT wiki represent "extra work" for participants? Or is it something that makes it possible to "share the burden" of existing and new activities with members of the community in ways that make the cost/benefit ratio lower for the community (individually and collectively)?

PF-3: Insufficient Seeds and Not Reaching a Tipping Point

The presence of tools and environments alone is insufficient to create a useful and usable system—systems need to co-evolve with their use in context: embodying practices of the design community, collecting exemplar design artifacts, and supporting the generation of tutorial/mentoring episodes; all contributing to the development of a seed sufficient to sustain itself. The process of developing this seed goes well beyond the technical aspects of the developing the tools and requires finding ways to enlist and encourage the design community to participate, often in the face of many other opportunities and pressures. The "tipping point" [Gladwell, 2000] in such efforts is not as simple as uploading photos or enlisting friends, but requires long-term engagement in design activities and finding synergies with other activities.

PF-4: Insufficient Understanding of Different Objectives

Applying categorical approaches without understanding the applicability in a given context can result in mismatches and problems. Life offers a wide variety of goals and objectives and social creativity can present itself in many forms. In some contexts, for example the CreativeIT community Wiki or course information environments, the objective is to have the community, resources, and values grow in a bottom up fashion out of the aggregation of contributions by participants. In others, for example the EDC, social creativity arises from concerted interaction around resolving multi-faceted issues or creating complex artifacts. These may be combined, such as in Wikipedia or the 3D warehouse where there is a strong top-down driving force (a complex artifact such as all of the buildings in the world, or an organic encyclopedia) that taps into the aggregate efforts at multiple levels. Without some understanding of these varied objectives and the ways that social creativity can be brought to bear, progress is stymied.

PF-5: Being Entrenched Group Think

To bring social creativity alive, participating stakeholders must be able to express themselves by combining different perspectives and generating new understandings to avoid being entrenched in "group think" [Janis, 1972]. When large and heterogeneous groups collaborate for long periods of time, *distances and diversity* among contributing individuals can *enhance* social creativity rather than hinder it. The challenge is not to reduce heterogeneity and specialization but to support it and manage it at the technological and social level by finding ways to build bridges between individuals and by exploiting conceptual collisions and breakdowns to stimulate imagination and invention. These distances appear in multiple dimensions: (1) *spatially* (across physical distance), (2) *temporally* (across time), (3) *conceptually* (across individuals, communities, and cultures), and (4) *technologically* (between human minds and artifacts) [Fischer, 2005].

PF-6: Not Exploiting the Ecology of Contributors

The ecology of contributors in an environment supporting social creativity is neither *uniform* nor *static* [Nardi, 1993]. Power users and local developers emerge spontaneously in many environments and their special effectiveness is grounded in their experience that they are not outside consultants but are an integral part of exiting social networks. Environments must have *low thresholds* and *high ceilings* allowing interested users to migrate from end-users to local developers and programmers.

PF-7: Insufficient Support for Social-Technical Environments

To design and develop effective *socio-technical environments* creates the following requirements:

- They are needed because deep and enduring changes are *not just technological but social and cultural as well.* Changes in complex environments are not primarily dictated by technology; rather, they are the result of an incremental shift in human behavior and social organization [Florida, 2002].
- They are composed *both* of computers, networks, and software, *and* of people, procedures, policies, laws, the flow of material and finished goods, and many other aspects.
- They require a *co-design* of social and technical systems, and use models and concepts that focus not only on the artifact but exploit the social context in which the systems will be used;
- They have as a critical component *meta-design* because it gives the users the design power to modify and evolve the technical systems according to their needs.
- They are for communities, not only for individuals, and in addition to supporting reflective practitioners they need to support reflective communities.
- They serve as a forcing function to reflect about the fundamental issue in an information society: "*Which tasks or components of tasks are or should be reserved for educated human minds, and which can and should be taken over or aided by cognitive artifacts?"*

Promises (PMs)

PM-1: Exploiting the Long Tail

Beyond being a phenomenon of interest to mass-market retailers and web-based businesses, the Long Tail [Anderson, 2006] has important implications for collaborative design and education. Understanding and exploiting the opportunities offered by the Long Tail will contribute to the fundamental transformational shift from an *industrialized information economy* (specialized in producing finished goods to be consumed passively) to a *networked information economy* (in which all people are provided with the means to participate actively in addressing personally meaningful problems) [Benkler, 2006]. Looked at from the producers' side, the Long Tail offers the potential to support and unleash new levels of creativity across all fields of human endeavor.

PM-2: Supporting Underdesign

People from various scientific disciplines [Benkler, 2006; Bereiter, 2002; Florida, 2002; Tapscott & Williams, 2006] have argued that we are in the midst of a technological, economic, and organizational perturbation, innovation, and transformation that allows us to rethink, renegotiate, and redefine learning, working, and collaboration. One of the fundamental changes taking place is the democratization of knowledge creation, innovation, and creativity [O'Reilly, 2006; Raymond & Young, 2001; von Hippel, 2005]. The emerging networked information society is focusing on the demands of active contributors for evolvable environments (including platforms, seeds, and tools) that are "underdesigned." *Underdesign* [Brand, 1995; Fischer & Ostwald, 2005] in this context does not mean less work and fewer demands for the design team, but it is fundamentally different from creating complete systems. The primary challenge of underdesign lies not in developing specific solutions, but in designing environments that allow the *"owners of problems"* to create solutions themselves at use time. This can be done by providing a seed against which situated cases that arise later can be interpreted. Underdesign is a defining activity for meta-design aimed at creating design spaces for others.

PM-3: New Concepts for Interaction and Collaboration

Interactive systems that support social creativity by allowing users to become active contributors will provide opportunities (see Table 1) to create broader sets of cultural practices and participation [Brown & Duguid, 2000b] and engage more people in expressing themselves and making their voices heard. Active contributors require different socio-technical environments: rather than having high-quality finished systems, they require seeds, platforms, and tools in order to evolve them [Fischer et al., 2001]. In such an environment, the social infrastructure supporting the communities of contributors is of equal importance as the technical support environment.

Table 1: Creating New Possibilities for Interaction

Established Concepts of Interaction	New Concepts of Interaction
user interface	interaction, engagement
ease of use	low threshold and high ceiling
closed systems	open systems
building from scratch	reuse, redesign, evolution, APIs, mash-ups, remixability, warehouses
productivity	innovation, creativity
users envisioned as accessing existing information	users actively evolving systems supported by meta-design methodologies

PM-4: Increase Value and Decrease Effort

Utility can be defined as the quotient of "value / effort". To obtain a sufficient high utility factor for motivating people to make creative contributions we can either

- *increase the value* for being a designer including mechanisms and rewards such as: allowing people to be in control, mastering a tool in greater depth making an ego-satisfying contribution to a group, and acquiring social capital;
- *decrease the effort* in making a contribution including mechanisms and rewards such as: creating support for learning to become an active contributor, extending meta-design to design for design communities by allowing local developers and gardeners to emerge, and exploiting automatically collected information sources as in collaborative filtering.

This is closely related to motivation and the question of "*...am I willing to make the additional effort and time so my voice is heard*?" Within the context of the CreativeIT Wiki, if the effort required for individuals to make contributions can be held to a low level as the benefit of shared information and resources grows, the potential of reaching both an individual and social tipping point increases. Our goal is to apply metadesign principles to both the social and technical aspects of system design to move in this direction.

PM-5: Supporting Reflective Communities

Social creativity needs the "synergy of many" [Bennis & Biederman, 1997]. The objective of educating "Renaissance scholars" (such as Leonardo da Vinci, who was equally adept in the arts and the sciences [Shneiderman, 2002]) is not reasonable in today's world [National-Research-Council, 2003]. We need to invent alternative social organizations that will support "collective comprehensiveness through overlapping patterns of unique narrowness" [Campbell, 2005] by integrating different interdisciplinary specialties which are partially overlapping with each other. Such architectures will provide a foundation that people can understand each other based on common ground but at the same time their expertise will be complementary because they will know different things. In doing so, we will move beyond the isolated image of the reflective practitioner towards the sustainability and development of reflective communities.

Reflective communities are social structures that enable groups of people to share knowledge and resources in support of collaborative design, working, and learning. Some characteristics of communities being reflective are: avoiding entrenchment in group think (see PF-5), support for reflection-in-action and reflection-on-action, critiquing, establishing common ground and shared understanding, and maintaining group productivity with joint attention [Fischer et al., 1998].

5 PUTTING INSIGHT INTO ACTION

One of the areas of discussion during the workshop was focused on how we create and maintain a *community space* and the role of artifacts in such an endeavor. The needs that were discussed included:

- support for multidimensional aspects, ranging from text to multimodal, physical to digital, private to public; and
- "uncooked to fully cooked" (from exemplars to seeds) while supporting the range from individual creativity to social creativity.

There is a need for socio-technical environments to share tools, artifacts, information, discussion, practices, tutorials, projects, meetings, and news and the awareness of community activity needs to be better supported.

The CreativeIT Wiki (see Application-3) is an effort to create and incrementally improve such an environment for the community. While at this point of time (Spring 2008) we have a good start with important resources being shared and numerous individuals involved, the "tipping point" for the CreativeIT community has not yet been reached. One factor is the existence of more established venues for participation and construction of "social networks" (e.g., conferences, workshops, panels), the associated products (e.g., papers, reports, monographs, books), and the recognition of academic capital associated with those efforts make it less likely that academic researchers, whose need for constant accrual of such capital is critical for tenure, promotion, and salary review, explore new modes, models, and approaches to creating new knowledge and new communities.

We postulate that the upcoming generation of researchers in this field may be a better target population for developing new cultural practices based on new forms of social networking, knowledge sharing, and academic capital. To this end, we have begun a focused effort to engage the graduate student population in areas related to creativity and IT (beginning with participants in the C&C 2007 Doctoral Consortium) to explore the potential of new media and networking capabilities to expand modes of academic knowledge creation, review, sharing, attribution, and evaluation as part of a continued community-building goal. This approach is built on the basic assumptions that these emerging researchers are:

- generally more fluent in the electronic media genres related to Web 2.0 and social networking technologies;
- often in a sparse landscape having no local research community around them and can benefit from distributed media and on-line activities to find others with similar research interests who are willing to provide critical feedback and support; and
- although not independent from the issue of academic capital, they are less entrenched in the current reward structure and may be more willing to explore new possibilities.

The discussion among the participants during the workshop resulted in some insights as to what successful outcomes for the community space might be. Key elements for the further development of the community space were:

- it should extend the community in ways that go beyond a focus on US academia by including broader international, industry, and community participation to enhance the description of creativity beyond what the academic community alone can develop;
- it should not support only cyber presence but extend into the physical realm with ways of integrating traveling projects and meetings. It should be well connected with links to and from the CreativetIT Wiki to and from other web sites and communities;
- it should be a place where validation and research could be supported. As a validation space, work and research could be used to persuade those in the position of evaluating academic capital about the value and prestige of these research directions. As a research space, collective knowledge construction should be supported and mechanisms for tracking and analyzing how creativity emerges by supporting aggregation should be created; and
- it should be a place for sharing and collaborating by evolving into a communal and dynamic reference space, serving as a useful resource for exemplary work, data sets, research tools, and for explaining and sharing ideas about best practices. This would allow new possibilities where, for example, data from various projects could be made available to permit a variety of analyses from different perspectives to take place. The space should be a secure, comfortable and inviting space to share half-baked ideas that will grow to fully baked ideas. By including industry in the process, it would provide a way to see who is doing what, what are the industry issues, and allow industry to pose projects and challenges to the research community.

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