

Supporting creativity in early design phases: Some initial considerations

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Abstract. With this paper we intend to open a discussion on the role that ICT can play in supporting creativity in the development of new processes and products. Most of the existing tools have a limited applicability since they are based on a limited perspective on creativity and innovation. Creativity can be enhanced with many techniques, which involve rich interactions among the team members and between them and their environment. Taking creativity seriously requires to deeply rethinking the role of technology and the requirements that the proposed solutions need to fulfil.

1. Introduction

One of the main challenges in early design phases of new products and processes is the need to escape stereotype thinking and increase creativity. In these early phases the collaboration among different actors, possibly with different backgrounds, can help to bring multiple voices into the design process, preventing people from following only preexisting paths and increasing team creativity. However the exploration, invention and implementation of new products and processes through a collective process of sense making is complex and it can benefit from the adoption of untraditional methods for supporting creativity. These methods may involve elements from artistic work (like theatre and painting), use of metaphors, techniques for enhancing cognitive processes, and merging of emotional and rational thinking. This means a large variety of expression and communication genres, active use of physical space, and multiple opportunities for sensing and inspiration. In this context ICT tools can be used to augment creativity by providing an infrastructure for cooperation and mobility.

The usage of ICT for augmenting creativity is gaining a growing attention (see, e.g. ([1, 2, 11])). Much effort has been dedicated in the past to the support of creativity as an individual process. The number of applications that look at creativity as a cooperative process in the context of work situations is more limited, though a number of generic groupware tools have long proved to have a beneficial effect on team creativity. Particularly interesting are the experiences with Group Systems, a system for supporting collocated meeting that has been widely used in organizations and schools [9]. One of the most relevant functionality offered by the system is the support for idea generation, where

the possibility to have anonymous submission by the group participants has proved to promote the generation of a higher number of ideas than in traditional meetings.

Despite a number of successes, the limitation behind most of the existing systems is that they are built on a very traditional notion of creativity, one that overlooks the richness of the creative process and the richness of the methods that can and must be adopted to promote it. Often the proposed solutions are based on the desktop metaphor that limits the adoption of these systems. The emerging of technologies that are more integrated into the physical environment and support users mobility opens new interesting opportunities, as illustrate for example in the i-LAND project [12].

In the following we briefly describe some issues connected with the support of creativity in early design and we then point out some challenges that this understanding of creativity poses on the design of ICT. The work that we present is based on our experience at the Oasis Innovation Laboratory, a facility and research laboratory for creative projects in industry, research, and education. In the last four years Oasis has conducted more than 90 creative work sessions and creativity courses. The staff comprises persons from design, architecture, and group dynamics.

2. Taking creativity seriously

We believe that the design of innovative processes and products should be supported by applying a variety of artistic methods, physical motion and special contextual atmosphere with the goal of creating a *flow* [3, 4]. Flow was defined by Csikszentmihalyi as the mental/physical condition characterized by a total integration of task and awareness, and where sense of time and self-consciousness vanishes. In these processes it is important to promote maximum participation, preventing the adoption of hierarchical communication structures. Particular attention must be paid to avoid stereotype thinking and avoid disruptive conflicts within the group. When the creative process involves teams with different backgrounds it is critical to foster a deep understanding of multiple viewpoints and increase cohesiveness. In fact, though diversity is normally an asset, it can also result in a higher level of conflict, as widely discussed in [7].

To achieve these goals it is necessary to use different methods and techniques. In fact, the most appropriate and effective way to enhance creativity depends deeply on individual's personality [6], as well as on e.g., motivations, context, and group composition. The best results are achieved when one can apply to the creative process the combination of methods that are best suited to the specific team and to the characteristics of the problem that they are dealing with. In Figure 1 we provide examples of methods that can be adopted in different situations, like painting, modelling, story telling, and role-play (Figure 1). At Oasis each creative process is designed by trained facilitators depending on the goals that the team wants to achieve and it normally adopts different techniques. Switching from one technique to another is often a way to get a new perspective on the problem but also a way to solve possible conflicts and to achieve a better communication within the group. For example, if a group is experiencing an impasse in a brainstorming session, starting building physical models of ideas can reduce the conflicts, lowering the tension by creating a more playful atmosphere.



Figure 1. Creative processes from Oasis

The results produced through such methods, and the meaning that is associated to them, are closely related to the social and emotional context in which they were created. For example, in Figure 2, on the right, there is a picture of a model produced in an early stage of a creative process on the role of technology in support of creativity. Though the combination of these two pictures can trigger memories and feelings associated with the meeting, they are mostly meaningless to other people.

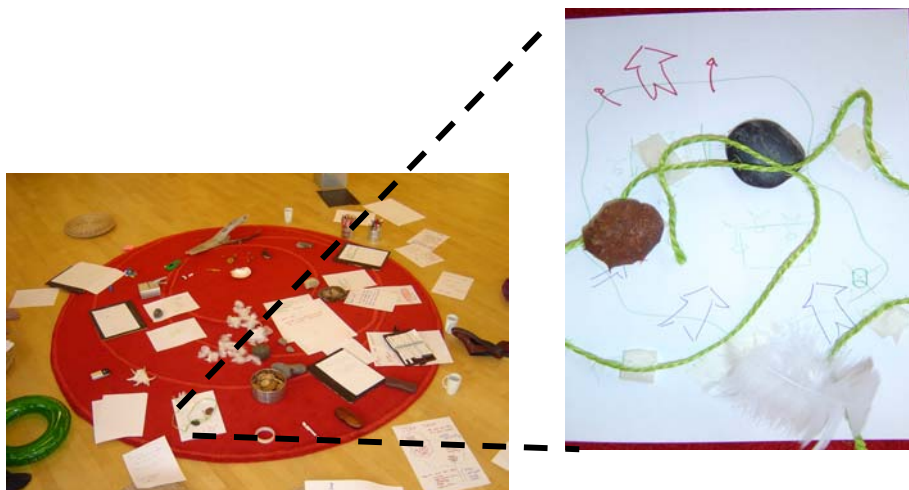


Figure 2. Results of a creative process

In this type of creative processes, there are three tensions that can play a key role in the outcome of the process and in the capability of the team to bring their ideas forward in later design and production phases.

Creativity vs. nurturing

Creative processes are normally embedded in larger projects, which are going on for months, involving not only creative idea generation, but also elaboration of solutions, analysis and testing, selection and decisions [5]. In this process the project team works in an organizational context where communication with users, management, peers and external networks is essential. The process is not necessarily linear, requiring often going back to early phases of the development project. Therefore, there is a need to study the *information logistics* of the whole project in which the creative processes are embedded (Figure 3). The ideas initially generated must be gradually transformed into accepted processes and products. This is often a major problem. This is partly due to the failure of the team in conveying the richness of the generated ideas to the external world where they need to be accepted and concretized.

Another reason behind the problematic transformation of ideas into concrete results can be connected to the incapability of the team to keep up the enthusiasm of the generation phase, especially when the team split after the creative process.

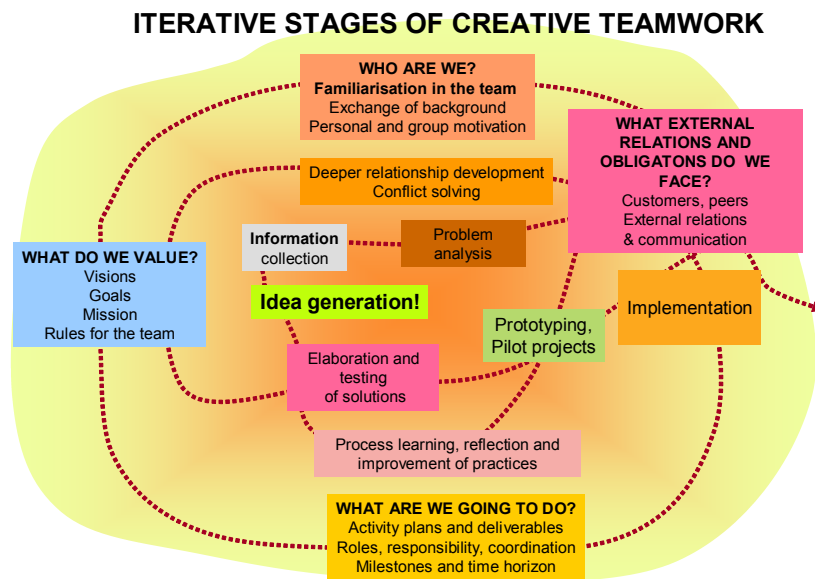


Figure 3. Iterative stages of creative teamwork

Creativity vs. productivity

We also often witness a difficult balance between creativity and productivity, as illustrated in Figure 4. These two might seem contradicting requirements, since creativity opens up the

perspectives and number of solutions, while productivity necessitates narrowing down to a smaller set of solutions. Both aspects are necessary parts of creative work.

CREATIVITY AND PRODUCTIVITY

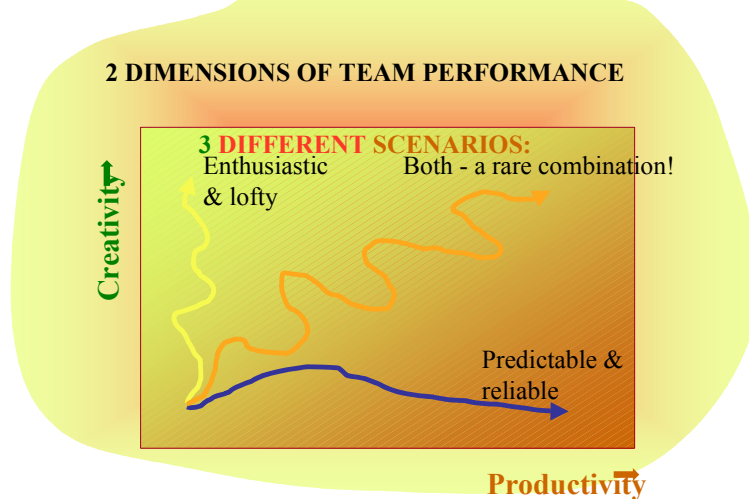


Figure 4. Creativity vs. productivity

Team vs. communities

We believe that the generation and concretization of ideas strongly depends on a number of social and cultural factors. In particular, we need to stress that people participating in a creative process are not stand-alone expert. Each of them is member of multiple communities [15] that could be fruitfully brought into the process. Each person brings into the process and gives access to a network of competencies and perspectives [8]. We believe that it is therefore important to support the moment when participants get together and make it a more integrated part of the life of the participants and of the communities they belong to, promoting synergies and serendipity. At the same time it is necessary to support the team members when they get back to their usual work environment to promote the new ideas that have been generated. In this encounter with new communities ideas get revised into a new process of sense making. If properly supported, this revision can enrich the proposed ideas.

3. Implication for supporting tools

A reference point when discussing ICT support for creativity is the framework proposed by Shneidermann [11], which accommodates different perspectives on creativity. The four-phase framework is intended to help designers in providing tools that systematically take into account the need to promote creativity. This framework is very generic and represents a good starting point to understand and design ICT support for creativity.

In this context we look at creativity as *the result of complex interactions among the team members, as well as between the team members and the external world, including their physical environment and social networks*. The convergence and fast increasing capability of ICT, media and communication opens up for richer support to creativity in teamwork. A warning is however in order. The condition of flow that is at the basis of creativity is very different from the intellectual, conscious and logical state of mind that is normally pre-assumed when people are working with ICT tools. One question is therefore how to support a creative process by means of ICT tools without interfering with the deep nature of the process.

We believe that the advances in mobile services offer an unprecedented opportunity to adopt tools that better integrate the creative process into work practices and everyday life. In particular, collaborative systems that are lightweight and mobile can be less disruptive than traditional desktop applications. In particular, the new paradigms of ubiquitous computing can support a beneficial shift of perspective [13, 14].

In addition the proposed ICT solutions must support different forms of cooperation around rich multimedia content. This creates a necessary but not sufficient precondition to reproduce the atmosphere, enthusiasm and other contextual aspects when the results are retrieved at a later stage in the project. We believe that a better support to capture and communicate the richness of the produced ideas and partly the emotional context where they have been generated can help to relieve the tensions that we have identified in the previous section. In this perspective, the notions of context and context awareness are critical and need to be studied in depth.

Last, but not least, we believe that the successful adoption of these solutions will depend on their capability to act as connecting tools: connecting *people, ideas, and contexts*. This capability of connecting also requires a switch from short term to long term creative thinking, with a better integration of the creative process into everyday life, as lately suggested by some authors [10].

With this short position paper we aim at bringing forward some challenges for possible ICT support for teams working on the development on new products and practices. Given the current state of the art we believe that there is a need to define a research agenda in the field, one that can be drawn only by acknowledging the complexity of creative processes and rejecting the idea that team creativity can be supported by tools that require people to sit alone in front of a computer. In this perspective we are evaluating the adoption of different existing technologies into creative processes to inform the design of new cooperative tools that better fit the needs of creative teams.

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