Åsa Ericson, Peter Törlind, Mattias Bergström (2010):
Future Ideation: creating ideas despite distance.
In Gunnar Stevens (Eds.),
International Reports on Socio-Informatics (IRSI),
Workshop Proceedings of 9th International Conference on the Design of Cooperative Systems - COOP 2010, Aix-en-Provence, France, May 2010
(Vol. 7, Iss. 1, pp. 264-270)

Future Ideation: creating ideas despite distance

Åsa Ericson
Luleå University of Technology, Sweden
asaeri@ltu.se

Peter Törlind
Luleå University of Technology, Sweden
peter.torlind@ltu.se

Mattias Bergström
Luleå University of Technology, Sweden
mattias.bergstrom@ltu.se

Abstract. Team-based innovation, which builds on the true collaboration and thinking together strategy are at the heart for most manufacturing companies today. This strategy builds on a multifunctional team to increase the innovation potential. Diversity builds up the multifunctionality within the team and is a prerequisite for coming up with new innovations. Efficient idea generation demands facilitation, one example is brainstorming, which is easily performed. However, brainstorming is often misused, as it is not applied properly. A successful brainstorm seems chaotic, team members use Post-It notes and/or a whiteboard to write and sketch down ideas. In engineering design, computer tools support many of the development team's tasks, but an interactive computer support for idea generation is not commonly used. Also, existing tools do not support the "physical" activities found in classical brainstorming, they are commonly based on the logics of documentation than actual facilitation of a creative process. The study in this paper is based on observations of design teams and the purpose is to set up and present a specification for an idea generation tool that is both facilitated and mimics the best aspects of physical brainstorming.

1 Introduction

To be perceived as innovative or to provide innovations are at the heart for most manufacturing companies today. The stress on using virtual teams, sustainable development and an extension towards a service perspective put even higher demands on radical and new solutions.

Despite the intentions to focus innovation, we have in previous studies found that it does not always align with how employees perceive that the company encourage and handle suggestions of new ideas. Such experiences have been gained through how innovative ideas are managed within companies, e.g. no resources are allocated to follow up and realize the idea. The reasons for such an approach are understood and acceptable for all employees, for example launching a new product usually means that one established has to be taken out of stock. Yet, these experiences have an effect on the degree of innovation activities. If most of the ideas are just waste of time and put the project's deadline at risk, why spend time on exploring radical ideas, i.e. idea generation? Balancing risks and opportunities are part and parcel of innovation strategies, but it could be argued that risk management is more focused and many promising ideas are killed as mere embryos.

The study presented in this paper builds on the assumption that an efficient and user adapted tool for idea generation could sustain an innovation process. Our purpose is to, based on our experiences within team-based innovation, computer supported work and participatory design, synthesise our observations of team performance in innovation projects with the proposals from the literature to set up and present a specification for an idea generation tool.

Very briefly described, the methodology that support the results presented in this paper builds on 10 years of observing design teams and research within the engineering design area. The included teams have varied from student projects to industrial product realization projects. The degree of innovation has varied from incremental improvement to radical products. The design teams' collaboration have spanned from co-located to distributed work.

2 Innovation and idea generation

Team-based innovation, which builds on the true collaboration and thinking together strategy, propose a multifunctional team to increase the innovation potential (Törlind 2002; Larsson 2005). It is by contrasting the distinct understandings that novel ideas can be found (Bergström 2009). For example, diversity in backgrounds, competences, knowledge domains and sphere of expertise build up the multifunctionality within the team.

The divergent aspects are a prerequisite for coming up with new ideas, new combinations, new solutions and new products, though often also the cause for

inefficiency. Therefore, it sometimes is argued that team work is waste of money, and that team work is often turned into team war (Paulus and Brown 2003). To prevent the innovation project to become a mess, team work has to be intentionally implemented and the idea generation phases have to be sufficiently supported.

Idea generation, i.e. to provide additional solutions and ideas, demands some facilitation to enhance the group effectiveness, i.e., a person within or outside the team takes the responsibility to lead the process. Such a facilitator needs specific competences to accomplish the role effectively and purposefully (McFadzean 2002). In view of this, idea generation is an assignment that essentially differs from ordinary product development work, therefore it can be perceived as both unplanned and inefficient. A method used for idea generation is e.g. a brainstorming session, where ideas should be presented under a limited timeframe, the quality of the ideas is not allowed to be judged and the team should go for finding as many ideas as possible (Kelley 2001). Brainstorming is an easily performed method, but oftentimes it is not applied properly. When the team goes with the creative flow and builds on each other's ideas, brainstorming is seemingly chaotic and quick. Commonly, the team members use Post-It notes and/or a whiteboard to write and sketch down ideas. Using sketching clearly improves group communication, idea development and expression (Tang 1991). The brainstorming session is usually performed on your feet; seemingly being on the "move" is part of the creative mode. The "landscape" of ideas that are displayed on the whiteboard after the brainstorming session is part of the result, if your creative session resulted in a bulleted list you have not performed a brainstorming session. This landscape of ideas acts as a record of the session and supports re-interpretive thinking and easy access to earlier ideas (van der Lugt 2005).

The basic logic for performing a creative session is to extend your view and explore alternatives that are not obvious from start. If facing a bulleted list with immediately realistic ideas it could be assumed that the team has jumped directly into solutions, probably such that they could have found anyhow. After displaying the ideas from the brainstorming session in what seems to be a hap hazard way, the team should categorize and cluster the ideas for taking them further. As a consequence the "landscape" is changed, therefore documenting and keeping track of "landscapes" of ideas is a challenge in brainstorming. Another important issue in brainstorming is the shared object manipulation by all the users, because building and annotating on the ideas or sketches of others are essential to increase not only the number, but also the quality, of the ideas.

3 Ideation tools

In general, in engineering design, computer tools are used to support many of the development team's tasks, but interactive support for idea generation is not commonly used. We have in previous studies (e.g. Törlind 2002) reviewed computer tools for idea generation and discovered that they do not support the "physical" activities found in classical brainstorming/sketching that are needed to encourage creativity and sharing of ideas in teams.

Also, contemporary ideation tools are commonly based on the logics of documentation and dissemination of the result than actual facilitation of a creative process. Finally, the tools specifically support text based idea generation, in reality innovation activities include more hunches and intuitions, which are not readily expressed only in text (Workshop Luleå 2010).

Reviewing the literature on idea generation support, we have found that proposals for more appropriate tools exists, but it is an intriguing question to ask why are they not realized, implemented and in use? For example:

- *Clearboard* (Ishii 1994) which combines remote sketching and videoconferencing between two sites, with gestures, eye contact and natural interface
- *Roomware* (Prante et al. 2004) which supports local sketching on private displays, sharing of objects to shared displays, annotation on shared objects, clustering and grouping.
- *The distributed designers outpost* (Everitt et al. 2003) which supports sharing of physical Post-Its in distributed meetings with a sense of presence of the remote users.

Boldly, we conclude that even though several promising concepts has been developed within the research community, the killer application for brainstorming and distributed sketching is still a challenge.

3.1 Five senses of interaction

One framework for categorizing and evaluating distributed tools for creative collaborative work is the five senses of interaction (Garrido, 2009):

- *Sense of presence,* describes the social presence – the feeling of being together that comes from the interactions between people (gestures, embodiment, spoken word, eye gazing etc).
- *Sense of space,* the interaction between the designer and the environment. This includes the awareness of physical location of other users and design objects.
- *Sense of sharing,* describes the interaction possibilities around shared design objects. A high sense of sharing includes that design objects can be modified by all designers at the same time.

- *Sense of time,* describes how events unfold - asynchronous or synchronous, and deals with the delay of communication.
- *Sense of naturalness,* describes how intuitive the system are.

Garrido (2009) found that commonly used tools are generally low on 'sense of presence' and 'sense of space'. Further, the tools, poorly support 'sense of sharing and sense of time', which are utterly present in co-located meetings. 'Sense of naturalness' in the case of providing for co-located behaviour is mainly lacking support by the tools.

4 Specification for a Future Ideation Tool

From our observations of distributed design teams we have found, for example that the lack of 'sense of presence' and 'sense of space' has hindered the workflow in the meeting, thus interrupted the ideation in the team. In one industrial project any sound from the video conferencing equipment made the session facilitator asking: "Are you still there? Can you hear us?". In one student project, long time was spent on finding out how to position the video conferencing camera to broadcast their interaction with a prototype. In our studies, so far, we have not observed a creative brainstorming session supported by technology that provides similar creative flow as in a co-located session. Based on our assumption that this is due to the barriers of technology, rather than people becoming less creative when using them, we propose a product specification for an ideation tool below in table 1, 2 and 3. A product specification should present what the product has to do, but not specify how to do it (Ulrich and Eppinger 2008).

Table 1. Software

Product specification: software
Easy update
Have connectivity to other tools
Provide a standalone work mode
Easy start and stop/log on and log off
Be compatible with other technology
Easy installation
Fast upstart
Highly interactive interface
Provide recording

Table 2. Hardware

Product specification: Hardware
Movable
High tech appearance
Lightweight
Affordable for firms

Table 3. Use

Product specification: Use	
Provide a private surface	Instil trust
Provide a shared surface	Prevent judgement of ideas
Allow swift use	Support multidisciplinarity
Allow easy operation	Support individual work
Enable visual work	Support shared work
Instil creativity	Easy access to results
Allow awareness of participants	Easy access to previous results
Allow awareness of work flow	Keep track of time
Support use of gestures	Bridge differences in preferences of work
Support use of postures	Provide facilitation
Allow awareness of mind-set	Affordable for firms
Support natural behaviour	Provide for flexible use
Support goal alignment	

Further work within this research project is to perform a workshop to develop the Future Ideation Tool, i.e. transform the specification into a product. The Future Ideation will be tested and evaluated in a three folded design observation study, where students, industry and academic representatives will be used. This paper is far from completed, we will report our rich empirical data more thoroughly, and also the literature review will be fully presented. This paper provides a first attempt to present the idea and gives us the opportunity to get feedback from the workshops participants.

5 Acknowledgements

This work presented in this paper is performed as a thematic research project in team innovation at Luleå University of Technology. We appreciate the financial support for building the Design Observatory from the Kempe Foundations and the Knut and Alice Wallenberg Foundation.

6 References

Bergström, M. (2009). *Probing for Innovation: how small design teams collaborate.* Doctoral thesis. Luleå University of Technology, Sweden.

Everitt, K., Klemmer, S., Lee, R., Landay, J. (2003). Two worlds apart: bridging the gap between physical and virtual media for distributed design collaboration. Proceedings of the SIGCHI conference on Human factors in computing systems: 553-560.

Garrido, P. (2009). *Exploring designers behavior in collaborative design meetings: a graphic approach*. Master Thesis. Luleå University of Technology, Sweden.

Ishii, H., Kobayashi, M., Arita, K. (1994) Iterative design of seamless collaboration media. Communications of the ACM.

Kelley, T. (2001). *The art of innovation: lessons in creativity from IDEO*, America's leading design firm, New York: Currency/Doubleday.

Larsson, A. (2005). *Engineering know-who: why social connectedness matters to global design teams*. Doctoral thesis 2005:19. Luleå University of Technology, Sweden.

McFadzean. (2002) Developing and supporting creative problem solving teams: part 2-facilitator competencies. Management Decision, vol. 40 (6): 537-551

Paulus, P.B., Brown, V.R (2003). Enhancing Ideational Creativity in Groups: Lessons from Research on Brainstorming. In Paulus, P. B and Nijstad, B.A (editors), *Group Creativity: Innovation through Collaboration*. Oxford University Press Inc. NY, USA: 110-136.

Prante, T., Streitz, N.A., Tandler, P. (2004). Roomware: Computers disappear and interaction evolves. IEEE Computer, December 2004: 47-54.

Tang, J. C. (1991). Findings from observational studies of collaborative work. *Int. J. Man-Mach. Stud.* 34, 2 (Feb. 1991): 143-160.

Törlind. P. (2002). *Distributed engineering: tools and methods for collaborative product development.* Doctoral thesis 2002:32. Luleå University of Technology, Sweden.

Ulrich, K.T., Eppinger, S.D. (2008), 4th edition. Product design and development. McGraw-Hill Inc.

van der Lugt, R. (2005). How sketching can affect the idea generation process in design group meetings. *Design Studies* 26 (2): 101-122.

Workshop Luleå (2010). Luleå University of Technology, a workshop in collaboration with Laboranova (http://www.laboranova.com/), February 11.