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# **Automating facilitation and group building tasks in co-located ideation sessions using multiple ideation tables equipped with projection and communication abilities**

Extended Abstract

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**ABSTRACT**

This paper provides insights into a prototype in a field we call "Innovation Enabling". The prototype is based on multiple round group tables, equipped with projectors and RGBLED-strips. The tables make brainstorming sessions an effortless experience for both the participants as well as the moderator by automating recurring tasks like group-building, moderation, documentation and sharing of the results. A vertically mounted interactive surface is used for further discussion of the ideas in larger groups.

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## THE GOALS OF OUR WORK

We propose a system that gives individuals an idea of their role in the team plus a way to share ideas with the team and beyond. The idea of creating spaces for sharing ideas, is nowadays used in big companies like Bosch or SAP. Our work enhances creative spaces by proposing an ubiquitous system following Marc Weisers idea of the invisible computer[3]. For this we propose a concept of an ubiquitous setting for computer supported creative work supporting both small teams and larger groups. The interaction by the user with the system is implicit. We introduced the concept of an awareness pipeline where we have a sensor and actor based approach of implicit interaction. This means that the data the users are generating while working together as an interdisciplinary team is used to generate actions by the system, that affect the users in a way that the system is enabling and enhancing the innovation ability in the daily work of the users. This paper will focus on a prototype that supports brainstorming sessions of both large and small groups.

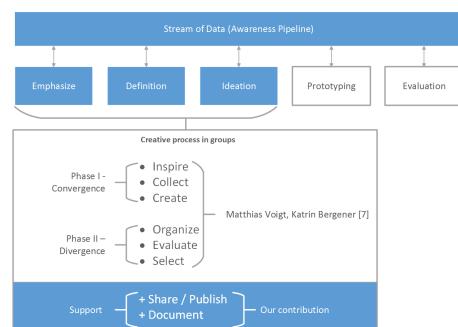
## INNOVATION ENABLING

The concept of "Innovation Enabling" describes our work, meaning that we support in particular the first phases of an innovation process: empathise, definition and ideation by using a socio-technical system. We define "Enabling innovation" as the combination of creativity, communication, collecting, creating, interacting, sharing and document, supplemented by a supporting structure and organisation support via technology. We follow the process of Design Thinking from the d.school with the basic principles: empathise, definition, ideation, prototype, and evaluate. Matthias Voigt and Katrin Bergener distinguish six patterns of collaboration to describe collaboration within an group creativity task. The patterns are divided into three patterns fitting divergence: inspire, collect, create and another three patterns fitting convergence: organize, evaluate and select[2]. Our System adds two patterns that are forming a support layer for the group creativity process: Share/publish and document (see figure 1 for an overview).

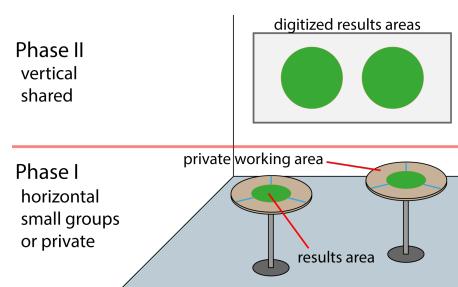
Vertical and horizontal working surfaces can promote different styles of collaboration [1]. We will combine the benefits of both by providing smooth and effortless transitions between the different collaboration patterns as stated before and orientations of the working areas. Technically our work is based on the principles and ideas of using projectors to augment surfaces and to interact with them using camera based tracking.

## THE PROTOTYPE

We propose a concept that supports the convergent and divergent phases of a group decision process. We support both phases you can see in figure 1) with a room that is equipped with a number of ideation tables and a shared interactive surface (see figure 3 for an example setting). In Phase I team



**Figure 1:** Overview of the field we are working in



**Figure 2:** Current setting of the prototype. Multiple ideation tables and a shared visualization



**Figure 3: The first iteration of the prototype: A standing table equipped with LED-Bands able to communicate via light patterns**

members get inspiration, collect information and create ideas at an ideation table individually and as a team. The table is divided in two areas. The outer part is reserved for each individual for their privately owned notes and information used for discussion of ideas with the table-team. The inner part is used as a results area. Elements that are put in the results area are accepted by the table-team for sharing and publication used in phase II.

Shared elements can be displayed on a vertical interactive surface for further discussion, evaluation and selection. For moderation and documentation, the ideation tables are designed as ubicomp systems using an assistive approach for moderation based on the data that is acquired during a brainstorming session. The tables we used have a diameter of a minimum 80 centimetres. That is big enough for up to five people standing round the table together without getting uncomfortable, but small enough to feel connected as a group.

We use RGBLED-stripes to be able to communicate to the environment around the table. The table can gain the attention of people around to encourage them to come closer and interact with the table. At the same time the table is able to show when an ideation session is over to gain the attention of a moderator in the room. We use a projector to divide the table in multiple zones: A shared results zone in the center of the table and a personal work space in front of each person. A web is used to track the surroundings and the surface of the table as well as to digitize the results placed in the results area.

We are able to dynamically change the surface of the table. This allows us to alter the size of the results area to encourage the participants to either put more ideas inside the results area or to think about taking some of them out by making it smaller. That means that the size of the results area is a direct feedback to the participants representing the groups performance. At the end of a session, the web cam takes a picture of the results area. Now, the image of the results can be exchanged between the tables to further stimulate idea generation or to be presented to all of the participants for further work on the ideas like structuring or evaluation. Because the camera is capturing the whole table surface, it is also possible to keep the ideas that didn't make it into the results area for further use. The private working area becomes sort of a private idea board you can take with you for further work on them.

By using multiple connected tables, our solution can be scaled to be usable for a bigger number of people without running into the problems that bigger discussion groups have, especially when the time for ideation is limited. Especially for bigger interdisciplinary teams dividing a big crowd into smaller subgroups can be interesting. It allows us to bring together the different disciplines within a project so we can encourage to think outside of the well known territory of the everyday work life.

## AUTOMATION OF RECURRING TASKS

In the current state our prototype is addressing invitation to an ideation session, moderation of the session as well as the acquisition and visualization of the results made by the teams.

We automate the group building tasks with our prototype by allowing the tables to communicate with the environment using RGBLED-stripes. By using different colors or blinking patterns the table is able to build specialized groups (there must be a mapping between a color and a discipline beforehand to make this possible). While the brainstorming session is running, our system collects metadata like the number of artefacts on the table or the speaking time for every participant. This data is used to adapt the visualization on the tables surface to steer the discussion like a human moderator would do. If the system detects, that one person is speaking all the time, not allowing others to get into the discussion, the table can actively select another person. The results are captured automatically and can be presented to all of the people together for further discussion. We came up with an idea that is derived from the way people are laying down their ideas written on post-it notes. We take a picture of the results areas and project it at a wall next to each other. We can group the ideas by rotating the ring shaped result areas. The ideas facing down are now forming a new cluster of results combining the ideas of different tables and thus forming the group approval of the session or simply represent a new set of ideas to further work or discuss on.

## FUTURE CHALLENGES

One of the unsolved challenges we are working on right now is the acquisition of large amounts of data needed to tailor our indicator system to the needs of group ideation support systems. We think that we can benefit from the discussions and inspirations at the workshop. The prototype presented in this paper will be our first test for automated data extraction from ideation sessions. The camera that will later be used for realtime adaption of the prototype can now be used to capture the whole scene while we evaluate our early visualisation ideas. By combining the video with multiple audio streams from each and every person working with the table using directional microphones, we will be able to detect the speaking time, the number of contributions and the general activity of each and every person using the ideation table. This allows us to measure the response and speaking time when a person is selected by the system. We are also working on using voice recognition and cognitive systems to further automate the sessions and data acquisition.

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