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KreativBarometer: Disclosing the dynamics of creativity climates

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Abstract

An approach has been designed and tested for computer-supported, repetitive micro surveys which measure dynamic changes of an organization's creativity climate. Employees are unobtrusively prompted to occasionally answer single questions. The main challenges are to ensure acceptance and to maintain a high participation. This is done by guaranteeing anonymity, avoiding perturbation and distraction, giving valuable feedback, and defining a framework of when and how the survey's results are being handled. This article describes the setup in which the service was first tested in several companies, the results and feedback given by the users and our approach to improve the KreativBarometer for the next phase of field tests.

1 Introduction

The motivation behind the development of the KreativBarometer[1] was the observation that traditional employee surveys turn out to be inappropriate for the dynamics of modern work scenarios. Innovative companies that have the need to be aware of the dynamics of their creativity climate, the "…stimulants and obstacles to creativity in organizational work environments (Amabile et al. 1996)", can utilize several survey instruments to measure this climate and to encourage organizational change. While these tools (e.g. KEYS: Assessing the Climate for Creativity,(Amabile et al. 1996); TCI, Team Climate Inventory,(Anderson & West 1998)) are well tested, they have the disadvantage of requiring much additional work to be realized. For example a meta-analysis in (Hossiep & Frieg 2008) examined that the average time needed between preparing a common employee survey and presenting the results is eight months. Considering that fast economic changes force organizations to adapt their processes, products and services in less time and to foreshorten the periods in between these changes we realized the need to overcome the limitation of one time a year surveys.

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The KreativBarometer enables organizations to timely counteract unpropitious developments by providing a continuing micro survey that is able to monitor and feedback the current creativity climate of a company or a team. This is done by repetitively prompting employees to answer short questions and continuously evaluating their answers. In this way employees can track how their own, their department's and their company's averaged attitudes change over time and compare their own perception of the working climate to their colleagues'.

This article presents the main features of the KreativBarometer (from now on KB), the insights we won from testing it in four companies and an outlook on how we want to further improve it. The central question is whether the features which we have derived for a first design cycle are appropriate and which needs for improvement became apparent.

2 Challenges and requirements

One, if not the most, important challenge for the KB's success is to maintain a sufficient participation rate over a long timespan. Because of its focus on changes over time, the tool needs the participants to remain active for several months. Unfavorable for this requirement is the fact that the same questionnaire's items have to be asked repetitively. This decreasing news value could be a negative influence on the participants' acceptance and motivation. Answering the questions may also be perceived troubling if the questions disturb the daily work routine or if the prompts for answering a question are presented at an unfavorable point of time. To meet these challenges the following requirements and features were identified and played a key role in the design process of the first prototype of the KB:

Anonymity: One central requirement is to guarantee complete anonymity if needed. Online surveys are conceived to provide anonymity (Levine et al. 1989; Locke & Gilbert 1995). Furthermore no personal data of the participants is stored. The username can be chosen freely and is only connected to the department (and thus the company) the person works for.

None-obtrusiveness and Short actions: The participants should be able to answer the questions very fast without getting distracted from their actual work. We worked out several approaches to this problem by identifying typical short idle phases during work when employees are usually bored since they have to wait for something: providing popups during the booting process of the computer, accessing to the survey via a terminal located at the coffee kitchen, a mobile device, or a modified screensaver. Testing all these approaches in the first design cycle was limited, because the companies wished for a browser-based solution which does not need to be installed on the participants' computers. Furthermore, the users don't need to answer more than one question consecutively. The phrasing of the question is as simple as possible. Picking one option leads to the presentation of the next question. It is our goal that the users to take part in the survey with the least possible effort.

Self-determination: The users can freely decide when and where they answer questions. The only restriction is that they have to complete a given amount of the questionnaire within a predefined timespan. Otherwise, their answers cannot be regarded in the evaluation of that survey cycle without distorting the results (e.g. a minimum of three answers in four weeks

regarding the category *autonomy*). The cycles help synchronizing the feedback to whole groups (e.g. teams or departments) and enable us to reflect a company's creativity climate at fixed points of time. To maintain a satisfying participation rate within the given freedom of decision, an optional email reminder was offered to the employees, which prompts them in a configurable frequency to answer questions and keep them aware of the survey.

Confidence and transparency via continuous reflection: The employees should not feel monitored by the survey. This requirement is met by a socio-technical approach(Herrmann 2009): Confidence is provided on the organizational level. The KB does not judge the creativity of individual employees but reflects the corporate culture. It empowers the employees to actively influence the environment and organizational context of their work. Transparency is achieved by the openness of information. The results of the whole company and of every group are visible for every employee. Additionally personal results are fed back. The KB also confronts the users with information about their behavior of answering. The participants can see how much of the current cycle's questionnaire they have completed and how many of their colleagues have been answering how many questions in the last days.

3 The first KreativBarometer prototype

The first practical test phase of the tool lasted from May to December 2011 when four companies used the KB to measure their creativity climate. The roll-out procedure was similar for all of them: In a first meeting we presented the idea behind the KB to the management and – if needed – to the company's IT-department and/or workers council. In a following workshop, the questionnaire's items were discussed and an optional adaption of the wording to the company's jargon took place. We also used this workshop for a brainstorming about when the employees could imagine to answer questions on a typical working day (humorously "on the toilet" was one of the most popular answers). Finally a launch event was carried out in which the web-frontend was presented and the registration keys were made public to the employees. They could also register for an email-reminder to keep up their awareness of the KB. The reminder supports the frequencies daily, weekly and bi-weekly.

The process of getting started with the KB is kept simple. The employees only need to register on the KB-website with an arbitrary nickname, a password and the registration key for their department. In the sake of anonymity participants are not asked for an email address, which is quite uncommon for the registration process of current web services. The email reminder service is hosted on a different server, in this way no connection between the KB-account and the person behind it can be established. After registration the users can log in to the KB-website and start answering questions. As explained earlier (2 – Self-determination) the continuous survey is divided into cycles. If a participant answers all items of the questionnaire before the end of a cycle, he/she has to wait for the next run until new questions appear for answering. This restriction is needed to keep the users results synchronized. At the transition from one cycle to the next the current results of the survey are calculated. This means, that the employees can see the first conclusions at the beginning of run two and the first relative changes of the creativity-climate (history) after run two.

To determine **the set of questions** for the KB project, we did not create new items; instead we picked questions from well tested and established instruments for measuring the creativity climate in companies. These include the before mentioned KEYS (Amabile et al. 1996) and TCI (Anderson & West 1998). The dimensions we chose to examine are: Vision, Autonomy, Collegiality, Stress, Ideas, Challenge and Leadership. E.g. the set of items for the dimension Collegiality is: “We share information with all other teammates, instead of keeping it to ourselves.”, “Within my team I feel accepted and understood.”, “My teammates support me when I made a mistake.”, “I think that all my colleagues have the same goal.” Additionally we formulated nine questions that investigate the companies’ innovation spirit, like: “For the sake of success, our department also questions established routines (‘sacred cows’)”.

Exploring the correlation between the employees’ health and the climate they work in was also a task in the KB project. The health aspect adds 11 more items to the questionnaire. The companies also had the chance to phrase some items for themselves; regarding issues they thought would be interesting to keep an eye on. This results in a set of 48 or more items in the KB-questionnaire.

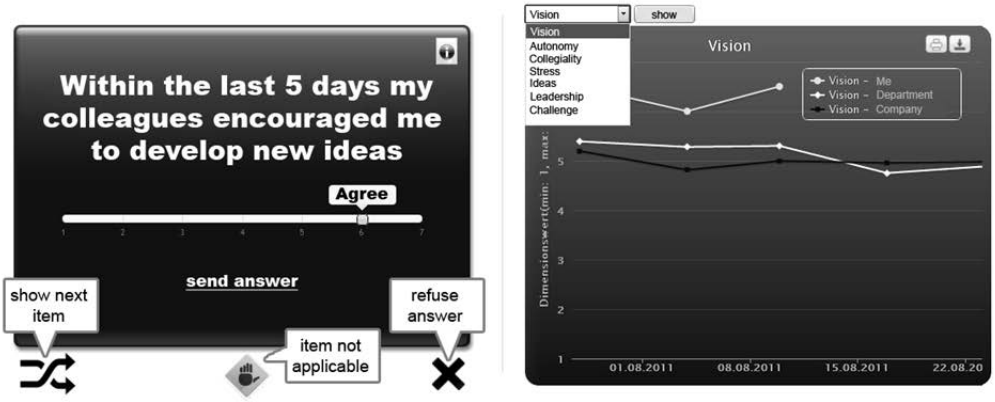

Figure 1: Screenshots of the web frontend: Answering an item (left); A history of results (right)

The **technical implementation** of the KB-server was based on JavaEE and on a Glassfish server; the data is stored in a mySQL database. The first design phase pursued an approach where accessing the server by the web frontend will probably not be the final solution. Therefore, the server features an abstraction layer which makes it easy to access it via different technologies. When logged in the user directly sees a question for him/her to answer. Besides sending the chosen value, it is possible to demand a different question or to refuse to answer this item in the current cycle (Figure 1 left). The results of the survey are displayed in the web frontend with the help of the javascript library Highcharts[2] (Figure 1 right).The huge advantage of the browser-based access of the server is that no installation on the employee’s

[2] Highcharts.com

computer is necessary. On one hand this minimizes possible concerns of the company's IT-department and on the other hand enables the users to participate from any computer that has online access (e.g. at their home PC or on a Laptop or Smartphone while being mobile).

The user participation is what we supposed to be the KB's key factor of success in **the evaluation of the first field test**s. Although the tool and the way we introduced it were the same for all four companies, the way the users participated differs strikingly between some of them. Table 1 shows the number of active users and the users that answered the whole questionnaire for the first five cycles. While Company A lost 13% after 5 months of using the KB, Company B's amount of active users dropped by 66.6%. Regarding the change in the number of employees that completed all questions, the difference is even more noticeable: Company A's Number went down by only 2% and Company B dropped by 47.7%. Of course these values are influenced by many unknown factors (e.g. holidays or workload), but they indicate that it is not enough to just launch the KB at a company to keep it running satisfactory. On the positive side it shows that the first prototype, even though it was browser based and thus demanded the participants to get active themselves (open browser > log in > answer questions), can be used for a continuous survey over several months.

When interviewing selected participants about their experiences with the KB, several complaints were communicated: The time it takes to start answering questions is too long and the process pulls the users out of their flow of work. Some participants did not like the pressure of having to answer a given amount of items before the current cycle ends. Despite these complaints many participants stated that they were satisfied with the KB and had no problems or annoyances answering the questions. The amount of data collected during the first field test is quite impressive, as over 33.000 answers were collected in our database.

Cycle No.	Active Users (Company A)	Users answering all questions (Company A)	Active Users (Company B)	Users answering all questions (Company B)
1	62	51	39	21
2	59	45	28	24
3	58	51	23	14
4	55	34	20	12
5	54	50	13	11

Table 1: Participation of two companies in the first five months

Several users created own mechanisms to keep their awareness of the KB up. One employee for example used a post-it at his/her monitor, while several others created a series of reminder events in their calendar. The email reminder we offered was used by 63 persons. The disadvantage here was that the emails kept coming even if the users had answered all items of the current cycle. Because of the anonymity of the tool and the separation of user accounts and email addresses there was no easy workaround to solve this problem.

Several participants said that some of the items were fun to answer, because they made them think about some aspects of their working life they normally do not reflect about, while other questions were annoying to answer repetitively; an example for the latter was the item “My workplace is inspiring and functional”. In regular working scenarios it does not make sense to answer this question every month. Sometimes the users were confused of how to answer a question because they were not sure which timespan they should reference. If the question is “Within my team I feel accepted and understood” and the employee generally feels that way, but was disappointed regarding this aspect several days ago, it is not easy to answer the item that is formulated in a very general way. These concerns reveal that question items that are used in regular questionnaires have to be adapted before they are included in surveys which are repeated in short cycles. Furthermore, repetitive surveys may have a strong influence on the employees since they are continuously prompted to reflect their own situation. This influence was expected but it is hard to evaluate it in detail by our studies.

The interpretation of the survey’s results was not as intuitive as we had expected.. Some participants were confused of how the values for the different dimensions were calculated. Also the meaning of the variance that was presented for every dimension could not be comprehended without additional advice. Very good feedback was given in regard to the result history and the info gained from the bonus questions the companies had added specifically for themselves. Seeing a snapshot with the results of the last cycle is like looking at the outcome of a common one-time survey. The employees can compare the values of the different dimensions, but it is hard to judge if for example a 3.4 in Collegiality and a 4.1 in Autonomy is a satisfying result or if there is a need for intervention. The change of these values over time on the other hand shows directly when and where there is need to act. If, for example, a department always rates one dimension with a value of 4 or more and that result descends below 3 in one cycle, it becomes obvious that an influencing factor had changed the category for the worse. It is the department’s task, to reflect about what happened in the regarded timespan that could have influenced the perceived climate in that dimension negatively.

When talking with the participants about their results, it was noticeable that the answers to the items that the company phrased specifically for itself were of very high interest. These questions most often dealt with problems that have been addressed within the company before. Keeping an eye on these known issues was perceived as a big benefit of the KB.

4 Improvements to the KreativBarometer

The insights won from the first design cycle were used to make changes on the conceptual and on the technical level. The improvements presented in this section will be tested with five companies in the second phase of the KB project. The companies that participated in the first phase can decide if they also want to employ the second KB prototype.

4.1 Revising the socio-technical process

To improve the participation's stability, the socio-technical process the KB is based on is extended. We understood that it is not sufficient to just launch the KB in a company and rely on the participants' intrinsic motivation to improve their creativity climate by using the tool. It is important that the initiators within the company communicate to the other employees when and how the results of the KB will be dealt with. Before the usage of the KB starts, it has to be determined how long the tool will run, after how many cycles the results will be openly discussed in detail and in which cases and how an intervention will be initiated.

In its first iteration the KB worked with cycles the length of a month. Now shorter cycle lengths are proposed. While we tested the KB with one week runs at our own institute, we decided to ask the next companies to implement 2-week cycles. The advantage of this change is the higher sampling rate of the creativity climate and that it is presumably easier to properly answer questions which refer to a shorter time span.

To avoid an increasing pressure by having to answer x questions in y days, the size of the questionnaire was reduced to 21 items. This reduction was influenced by three factors: The statistical relevance of an item, the dynamics of the answer values (neglecting aspects that are only a subject of minor change) and the focusing on items that helped to analyze the difference between companies according to categories such as human- or goal-orientation.

To ease the understanding of the results an additional evaluation was created. It is based on the same set of items as the seven dimensions and classifies some of the questions as human-orientated and some as goal-orientated. Using these two dimensions as the axes of a coordinate system builds the "creativity-matrix" in which a company's creativity culture can be represented as a single point.

4.2 Technical improvements and developments

After determining the aforesaid possibilities for improvement of the KB within the socio-technical process, we implemented further enhancements and integrated them into the prototype on the one hand. On the other hand we focused on further possibilities of participating in the KB survey for the user and therefore developed two additional software frameworks. In detail, we improved the original web-frontend of the prototype by three main features:

Statistics for single questions: Due to the possibility of adding corporate related questions to the KB-system, the necessity of reflecting the result-values for each single question emerged. Similar to the dimension values, results for single questions are visualized.

Visualization of the user participation: During the socio-technical elevation we realized that there is a significant need for easy access to information about the participation during the survey cycles. Instead of just presenting this info via text it is now visualized in a Highchart's bar graph.

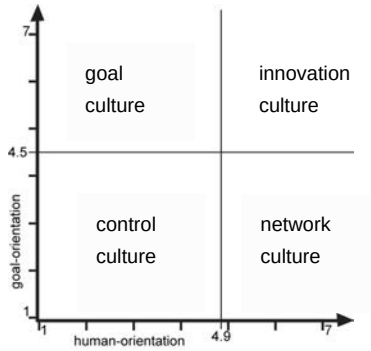

Figure 2: Creativity-matrix

Creativity matrix: In order to give the users an appropriate feedback about their creativity climate we developed the so called 'creativity matrix'. This matrix gives information about how goal-oriented and human-oriented the creativity climate within a company is being reflected by its personnel. Depending on the results, values can be assigned to one of the following cultures: goal-culture, control-culture, network-culture or innovation-culture (Figure 2).

As aforementioned, we also developed two further possibilities of participating in the KB-survey in order to support the unobtrusiveness, mobility and possibility of answering questions en-passant for the user:

windowsClient: The windowsClient's main focus is to remind the user unobtrusively about the KB-survey. Therefore we have implemented options for the users of how they want to be reminded after a certain time of inactivity (like a screensaver), e.g. by a balloon tip or by popping up the client's KB-GUI. This reminding can be switched off. Furthermore, there are two different visual styles of the KB-GUI, a compact (Figure 3 left) and a maximized one.

mobileBrowser: The focus of the mobileBrowser version is mainly to increase the mobility of the user, thus e.g. giving him the opportunity to answer questions everywhere being en route, especially via mobile handhelds. Its GUI is basically adjusted to small screens, but – similar to the windowsClient - the main functions have been transferred from the original web-interface (see Figure 3 right).

5 Conclusion and outlook

The first practical test phase of the KB showed that it can be used to gather information about a company's creativity climate and its dynamics over a longer time span. It is important to mention that implementation of the tool alone is not sufficient to keep the participation at a satisfactory level in every organization. There needs to be scaffolding that supports the continuous survey. Especially rules regarding how to deal with its results have to be

defined to avoid that the users get the feeling of “answering into the void” without noticing any benefit or goals.

Implementing the KB can be seen as a first step in improving a company’s creativity climate since the presence of the tool in everyday working life shows the organization’s general interest in creativity/ innovation and makes the employees reflect relevant aspects. We are aware, that constantly showing the results to the users can influence their answers, but it is the KB’s objective to reveal changes and dynamics in the climate. The main purpose of the KB is putting a focus on aspects that promote or hinder creativity but not to conduct a neutral measurement. However, it is a promising research question to understand how continuous surveying influences a company’s culture with respect to the subject of the survey.

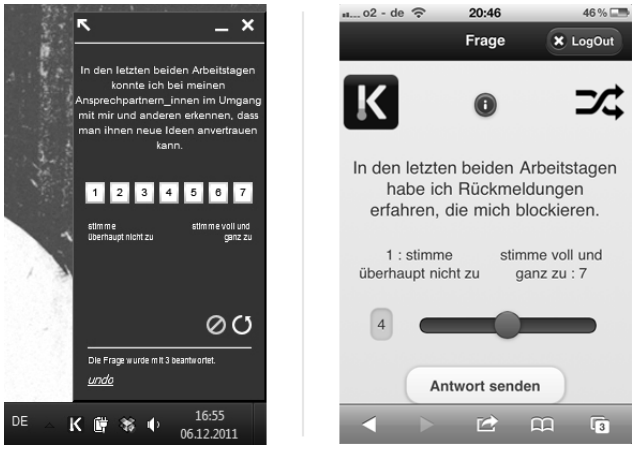

Figure 3: an item spawning from the Windows System tray (left) mobileBrowser GUI (right)

Additional insights regarding the ways of using the KB were won. The tool can also be used for selective checks of the creativity climate from time to time. A different approach is using the KB to check the success of interventions by starting the usage some weeks before it and monitoring if the method changed things for the better.

In terms of the technical implementation the browser based first prototype was not satisfactory regarding the possibility to answer items en-passant. The Windows client improves this, but we think that with modern technologies like smartphones, there is still much space to make the answering faster and less obtrusive. Because the feedback given by the users was very diverse, the best solution is to offer a variety of options of how to participate at the KB. The user needs only one account and can answer items via the desktop client, a browser or on a mobile phone. She/he is also free to choose if an additional trigger is needed, like the email reminder or calendar entries.

The focus of the first design cycle was defining the socio-technical process the KB is based on and creating a technical solution that enables the gathering of information from employees over a longer time span. There was no content related analysis regarding the dynamics of organizations’ creativity climates made yet. Because of this we cannot say for sure that the

KB is suitable for that task. Even if that may not be the case it can be applied in all kinds of scenarios, in which a continuous feedback from a group of people is needed. Since the practical test of the KB's second iteration has not taken place yet not many statements regarding the improvements on the conceptual level can be made at this point of time.

Nonetheless working towards a system in which the users are intrinsically motivated to participate is a goal. A first step would be to eliminate as many restrictions as possible. Dropping the static questionnaire and thus enabling users to answer as many questions as they like would be a step in this direction. As a result fixed cycles would cease to exist and the need for a dynamic evaluation of the given answers would emerge.

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