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CONNECTED CREATIVITY – A HUMAN CENTERED COMMUNITY PLATFORM FOR INNOVATION IMPULSES

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Abstract: In this paper a concept for a community platform is introduced focusing on human factors of motivation and barriers in the context of innovation. Building on the state of the art, a three year case study in cooperation with Dr. Ing. h.c. F. Porsche AG is at the core. In a first step, a questionnaire and interviews are used to point out that a new attractive channel for ideas is needed. Based on these findings, in a second step, a software prototype is being designed and introduced in a pilot project with ca. 200 users. By using a questionnaire and expert workshops, in a last step, this project is evaluated as appealing to the community and the generated content demonstrates to be valueable to specific design activities.

Keywords: *Innovation Management, Community Platform, Human Factors*

1. Introduction

Innovation is a key factor to the success of economy, technology and society (Schumpeter, 1934). It is built on small, but creative pieces of knowledge: on innovation impulses (Maul, 2014). Innovative organizations are challenged to continuously and systematically generate and support innovation impulses. At the same time, new possibilities emerge for sharing and processing knowledge in virtual online communities. The concept of a community platform inside an organization seems to be well suited for the challenge of processing innovation impulses for design activities. Such community platform should be considered as a human centered socio-technical system with interactions between the system elements users, experts and organizational stakeholders.

2. State of the Art

2.1. Innovation impulses

With the generation of innovation impulses, organizations face numerous challenges (Scholl, 2004). The Open innovation approach provides new impuses form outside the organsiation (Chesbrough, 2003). At the same time, an organization's own employees from various divisions can be useful sources for new product ideas (Bansemir, 2009). However, these impuses have to be considered in the context of models of product engineering and innovation management, in order to be integrated into appropriate engineering design activities (Hauschildt, 2011). The integrated Product engineering Model (iPeM) provides a framework for integrating activities situation specificly (Albers, 2011). In order to improve the integration of impulses, they should be investigated in context of the iPeM.

2.2. Community platforms

In order to provide an environment for a community to exchange innovation impulses, organizations are facing two main tasks: design of community platform on one hand (Leimeister, 2006) and its integration within the organization on the other (Venkatesh, 2008). Depending on the specific goals and conditions of the organization, the wide range of possible platform functionalities has to be considered and selected in the platform design (McAffee, 2006). Furthermore, for the integration of a platform, an implementation process has to be individually adapted, according to the requirements within the organization (Kotter, 2011). For this reason, potential users, experts and stakeholders have to be involved (Mohr, 1998), which is rarely researched thus far in the specific context.

2.3. Human factors in engineering design

Human factors are a crucial success factor for the design and integration of a community platform. (Albers, 2013). With a socio technical system understanding (Rohpohl, 2009) three perspectives can be identified: users who generate and discuss impulses, experts who evaluate and transfer impulses into products and stakeholders who are part of the organizational framework. The user's motivation can be improved with the help of 'the compensatory model of work motivation and volition' which includes three components: explicit motives, implicit motives and perceived abilities (Schattke, 2009). Explicit motives constitute the reason for a person's actions and they can be expressed by a person. In contrast to that, implicit motives are subconscious and lead to behavioral impulses. Perceived abilities are the basis for people to perform an action (Kehr, 2004). With regard to implicit motives, three kinds of needs can be distinguished: the need for affiliation (social relationships), the need for achievement (desire for new challenges) and the need for power (control and reputation) (McClelland, 1987). From an expert's perspective, with a community platform, four types of barriers can arise (Gemünden, 1996): barriers of not-being-allowed, not-wanting, not-being-capable and not-knowing. Overcoming these barriers, the transfer of impulses to the experts can be improved (Albers, 2014a).

3. Aim of research and methodology

Based on the state of the art, it can be determined that community platforms for innovation impulses are rarely researched in the context of human factors regarding users, experts and stakholders. Thus, the following hypothesis is introduced in order to provide a basis for the research of this paper:

Putting human perspectives of users, experts and stakeholders in the center of design and integration of a community platform can contribute to an organisations innovation capability.

Therefore, the following research questions have to be answered:

1. Which requirements for a community platform are defined by the involved humans?
2. How is a community platform designed and integrated according to these requirements?
3. What can a community platform contribute to an organization's innovation capability?

In order to answer these questions, a three year case study in cooperation with the innovation management of the Porsche AG is carried out which allows for in-depth investigations. Therefore, an approach aligned to the design research methodology (Blessing, 2009) is used as shown in figure 1.

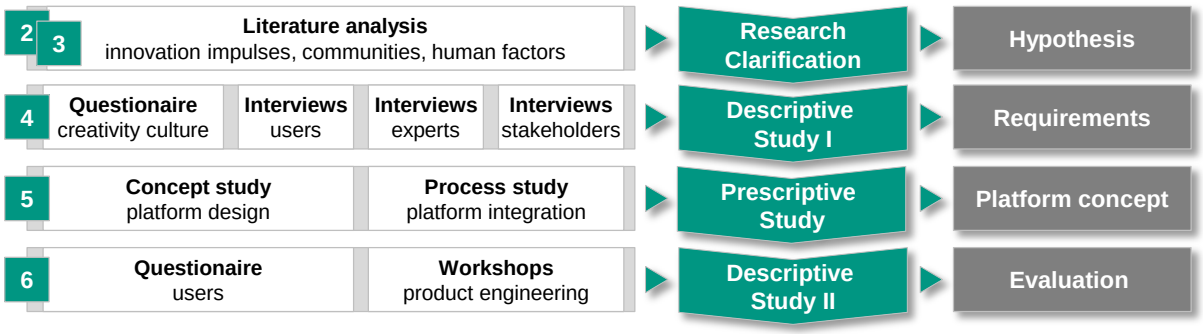

Figure 1. Research methodology

4. Investigation of the requirements

At first, the initial situation on creativity culture is investigated. Afterwards, requirements are collected from the three perspectives of the users, the experts and organizational stakeholders.

4.1. Initial situation on creativity culture

228 employees from different departments which are involved in the innovation process have been surveyed with the help of a questionnaire on the current state of creativity culture in their organization. In Table 1, the average answers of the 140 respondents are shown.

Table 1. Results from the questionnaire on creativity culture

	mean	σ
To me, new ideas and changes are essential at Porsche	4,28	0,89
We gladly accept ideas from outside the organization	3,51	1,12
From my understanding of the strategy […] innovation is part of my job	3,27	1,38
appreciation (praise, recognition) […] facilitates my creative output	3,20	1,42
In order to innovate, we work interdisciplinary	3,09	1,37
We communicate across the borders of departments and ressorts	2,89	1,36
financial compensation (salary, special bonus) […] facilitates my creative output	2,68	1,56
I have enough channels to share my ideas within the organization	**2,49**	**1,34**
During day-to-day-business I find enough time to develop my own ideas	2,13	1,18

5 completely agree

0 completely disagree

indirectly adressed by a community platform

directly adressed by a community platform

Overall, it turns out, that the employees are willing to exchange ideas and accept changes. In this context, they appreciate recognition for their effort more than financial compensation. However, the employees lack channels to share their ideas within the organization. By appropriate design and integration of a community platform these desires can be addressed.

4.2. Requirements from a user's perspective

With the help of 20 semi-structured interviews with potential users, motivational aspects have been identified. For the purpose of a community platform in which participation is voluntary, it is necessary to make sure that all motivational aspects are covered (Albers, 2013). Thus, users need to be motivated explicitly as well as implicitly and must be enabled by their perceived abilities. In Figure 2, example statements from interviewees as well as derived requirements are shown.

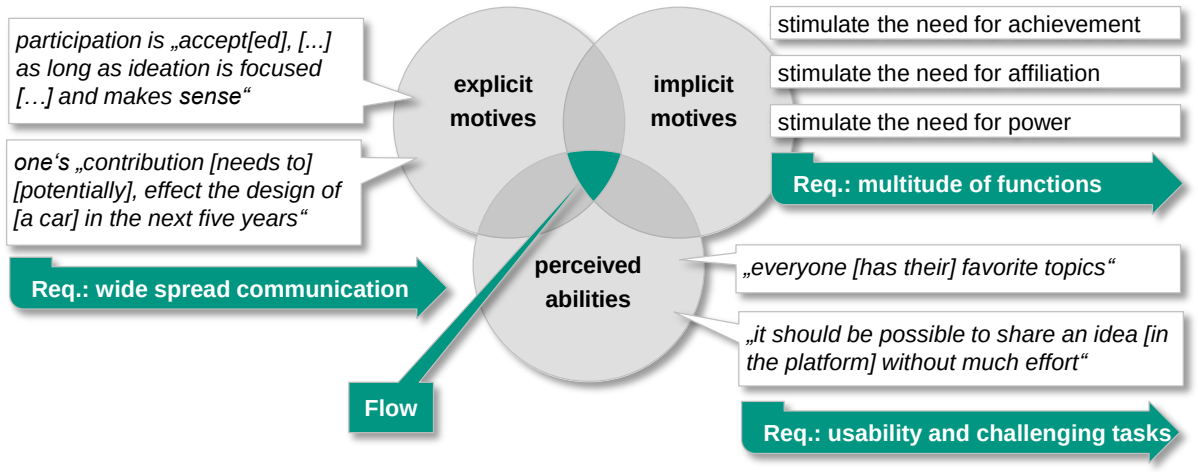

Figure 2. Components of user motivation and implications for the design of a community platform

From the interviews the following implications can be derived: Firstly, in order to foster explicit motives, the relevance of the platform needs to be shown by wide spread communication across the organization. Secondly, considering that every potential member of the community is an individual, a community platform should offer a multitude of different functions to motivate all kinds of users:

functions to stimulate the need for affiliation (e.g. personal profiles), functions to stimulate the need for achievement (e.g. feedback on own ideas) and functions to stimulate the need for power (e.g. names and portraits next to shared ideas). Thirdly, since every user will define his perceived abilities differently, it is suggested that several innovation tasks with different levels of complexity and different topics are given to the community at the same time. Furthermore, usability and easy access have been identified by the interviewees as another crucial issue.

4.3. Requirements from an expert's perspective

In order investigate a second perspective, 10 experts responsible for advanced development projects have been interviewed. The four types of barriers are used to structure the interview questions. In Figure 3, example statements to each type of the barriers as well as derived requirements can be seen.

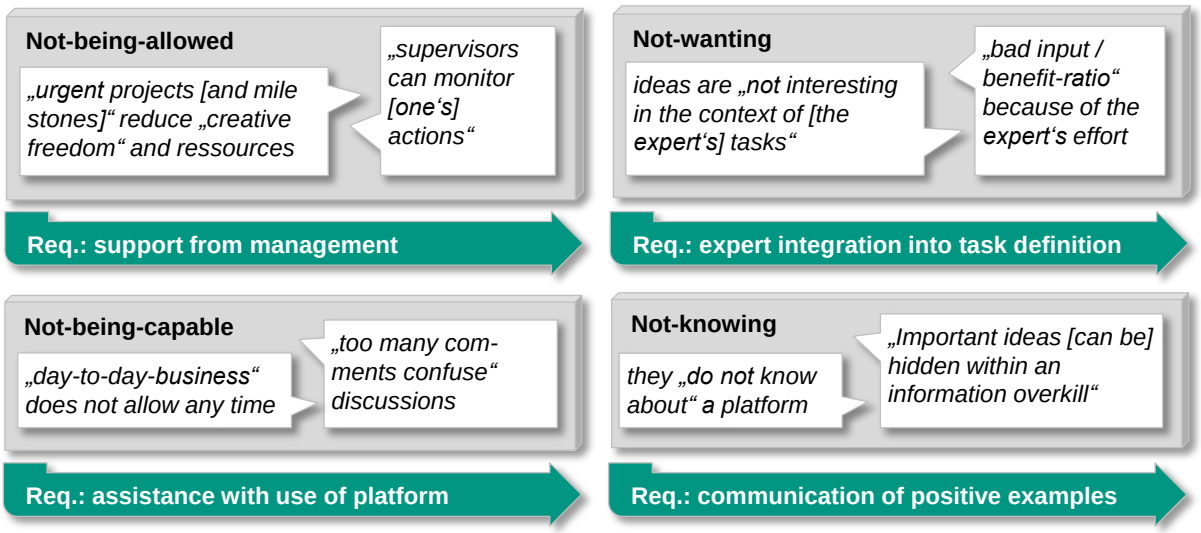

Figure 3. Components of user motivation and implications for design of a community platform

From the statements the following implications can be derived: Barriers of not-being-allowed can be mostly influenced by the management by officially supporting the use of the platform. Barriers of not-wanting are often related to the fact that the ideas of the users on the platform do not match the expert's daily activities. Thus, the innovation tasks published on the platform should be defined in cooperation with the experts. Barriers of not-being-capable can be overcome by assisting the experts with selecting ideas and contributions from the platform, e.g. by a concentrated 'Top 10'-overview. Barriers of not-knowing about the platform can be influenced by intensive communication of positive examples originated from the platform.

4.4. Requirements from a stakeholder's perspective

In order to investigate the stakeholder's requirements, ten organizational units have been identified with the help of a stakeholder analysis: the works council, human resources, idea management, intellectual property department, corporate legal department, employment law department, data protection, IT system administration, IT security and purchasing department. Up to four specific workshops have been conducted with between one and three representatives of each of these stakeholders. With participating observation in these workshops, the following implications regarding legal documents, software design and system architecture can be derived: Terms of use establish the rules for ensuring the interests of the organization, while an agreement between the management and works council ensures the rights of the employees. Adjustments to the software can for example guide the users in issues of intellectual property management with text boxes and advice on the start page of the platform. Furthermore, the software architecture needs to be compatible with the IT system landscape of the organization.

5. Development of a concept

Based on the requirements from the users, experts and stakeholders, a platform concept is designed and implemented by Hype Softwaretechnik GmbH (see Figure 5). The platform presents innovation tasks to the users and offers a function to share new impulses with the community. These can then be developed, discussed and voted for by other users. Other functions for fostering user motivation are included, for example personal profiles to upload user portraits which appear next to the author's contributions.

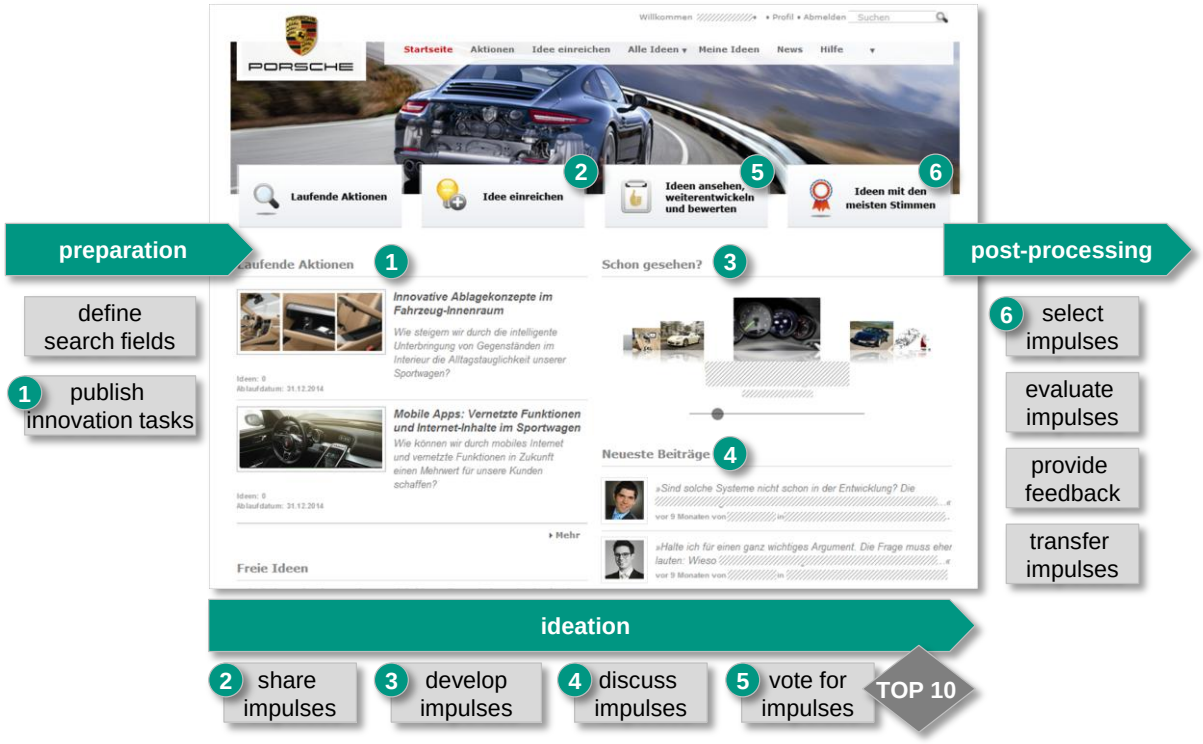

Figure 4. Implemented platform design according to concept and process

For the use of the platform, three phases can be distinguished: preparation, ideation and post-processing. In the preparation phase, relevant future search fields are derived from market and technology trends in cooperation with experts. Based on these, every four weeks two new innovation tasks are selected and published on the platform. In the ideation phase, the users can share, develop, discuss and vote for impulses in context of the given tasks. The post-processing phase starts once the tasks are finished and the ten most voted impulses are selected to be evaluated by the experts. These provide feedback to the users and transfer relevant impulses into the advanced development process.

6. Evaluation of the pilot project

The developed concept has been introduced during a pilot project with over 200 users from one division of the Porsche AG. During four months with six different innovation tasks, more than 80 impulses, 50 contributions to further development, 70 comments and 300 votes have been generated by the community. For the evaluation of the project, a questionnaire is used to capture the user's opinion and expert workshops are carried out to evaluate the community's contribution to product engineering.

6.1. Evaluation of the platform concept

All 218 users have been surveyed with the help of a questionnaire on questions of design, integration, potential and conditions of the platform. In Figure 5, the average answers of the 64 respondents are shown.

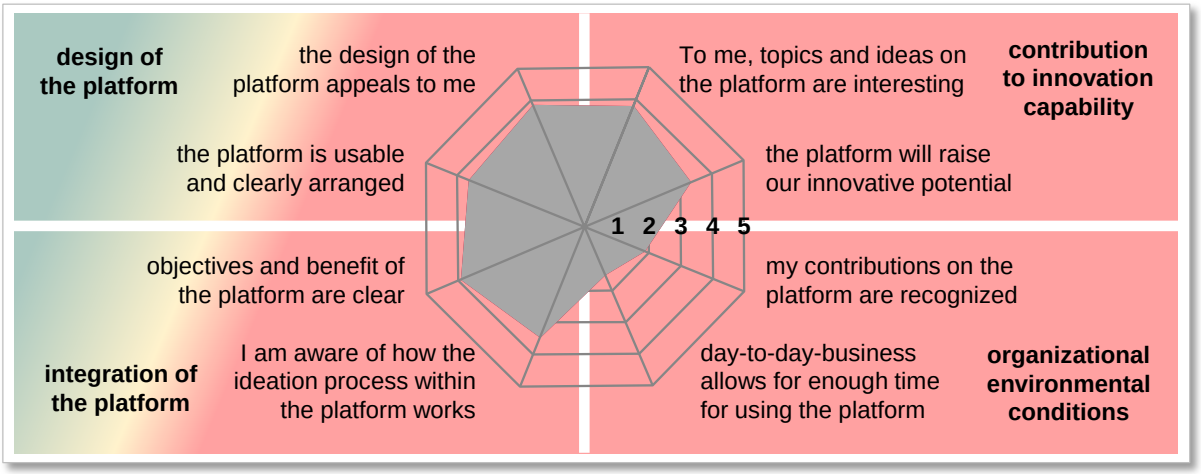

Figure 5. Evaluation of the platform (0 = completely disagree, 5 = completely agree)

It turns out that the design of the platform appeals to the respondents and they perceive it as usable. They find the topics and ideas on the platform interesting and see an innovative potential for the organization. Regarding the integration of the platform, objectives and the benefit have been clearly communicated and the ideation process seems transparent. However, the users see potential for improvement in terms of the organizational environmental conditions. They feel their contributions on the platform rarely recognized and day-to-day-business allows not enough time for using the platform. Therefore, an innovation-friendly strategic orientation is necessary in order to recognize inventive efforts, provide freedom for creative activities and shape the organization's culture.

6.2. Evaluation of contribution to product engineering

Since innovation impulses effect innovations often indirectly and with a certain delay, possibilities of quantitative measurement are limited. However, in order to manage innovation processes, it is more important to know what kinds of impulses are generated by impulse sources. Therefore, the iPeM provides a framework to classify impulse sources depending on their contribution to product engineering. As a meta model, in the iPeM, relevant fields of action within a development process are represented by the activities of product engineering (see figure 6, vertically arranged). Each of these fields can be further subdivided by the seven steps of the SPALTEN problem-solving activities (see figure 6, horizontally arranged). SPALTEN is a German acronym which means 'to split' and it stands for: situation analysis (S), problem containment (P), detection of alternative solutions (A), selection of solutions (L), analysis of consequences (T), deciding and implementing (E) and recapitulation and learning (N). In workshops with product development experts, each contribution from the community platform is matched to an activity within the iPeM framework. Furthermore, the results from the following four other impulse sources are classified in the same procedure: a workshop from a car clinic with customers, an online idea contest with students, a cross-industry innovation workshop with medical equipment engineers and an online technology scouting platform with suppliers, see figure 6.
Looking at the community platform, half of the contributions are related to idea detection, especially to the problem solving steps alternative solutions, selection of solutions and analysis of consequences. Other impulse sources are especially valuable for other activities. Customers in a user clinic workshop provide insights into their needs, which is valuable for situation analysis in profile detection. They also point out specific design issues, which can be used for the detailed modelling of the embodiment design. An online idea contest with students shows to be helpful to identify market trends for a future profile situation analysis as well. In addition, the participating 'digital natives' provide alternative solutions for ideas and principle solutions and can help analyzing consequences based on their own experiences with new products. In a cross-industry workshop with a medical technology company, alternative solutions of ideas and principle solutions can be exchanged and transferred with the help of an analogy process. The specialized technical knowledge of suppliers also delivers alternative ideas,

principle solutions and embodiment designs. Furthermore, their expertise is helpful when analyzing consequences of the proposed designs. The study shows that different impulse sources contribute to different activities of product engineering. Innovation management faces the challenge to select and combine the right impulse sources depending on the situation and given task.

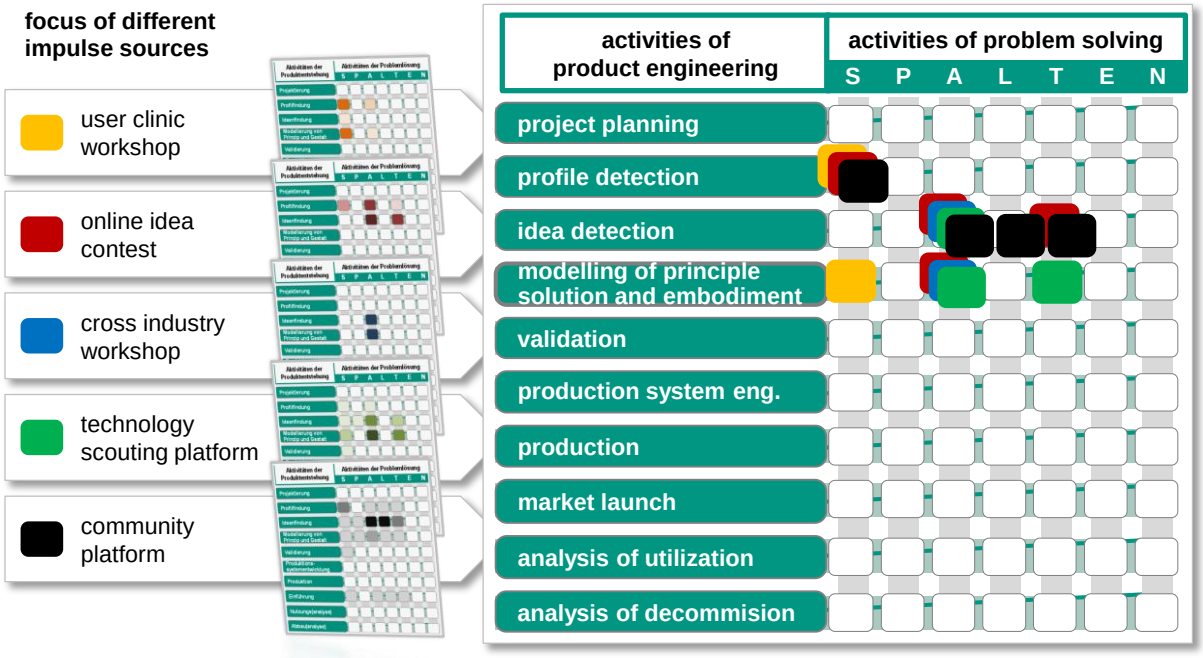

Figure 6. Focus of contributions of different impulse sources

7. Conclusion and Outlook

7.1. Conclusion

Putting humans in the centre has shown to be the most important success factor in the project. In order to take the needs of the involved humans into account, a community platform has to be designed and integrated collaboratively and iteratively. Thus, interviews, workshops and questionnaires are recommended to create empathy for the perspectives of the users, experts and stakeholders inside the organization. Looking at the experience from the presented three year case study, an early integration and commitment of the top management appeared as a key success factor.

7.2. Outlook

The situation appropriate selection of impulse sources and methods depends on various factors and organizational conditions. The German federal ministry of education and research (BMBF) has initiated the current project IN² - from information to innovation. In the project the systematic development of innovation by an intelligent management of methods, knowledge and processes is investigated (Albers, 2014b). In the project, the community platform approach presented in this paper as well as other methods to include new impulse sources (see section 6.2) are systematically collected. With the use of an application for mobile devices ‘InnoFox’, these methods amongst others can be automatically recommended depending on which ones are most appropriate in the specific situation (Albers, 2014c). This way, it is possible to integrate the findings of this paper into the daily business of product developers.

Since the findings of this project in cooperation with the Porsche AG are mostly applicable to other large companies, future research faces the question, how to make a community platform approach suitable for small and medium sized enterprises (SMEs). With a cooperative approach between universities and SMEs, a common community platform should be developed which allows SMEs to post innovation tasks in order to harness the creative potential of researchers and students.

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