PROVOKING ITERATIONS IN IDEATION WORKSHOPS – AN EXPLORATIVE STUDY

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Abstract

There are at least two different perspectives on iterations in product development processes (PDP), a negatively connoted management perspective and a positively connoted engineering perspective. This paper aims at revealing more about both perspectives on iterations in early phases of product development, and to provide hints about the impact these iterations might cause. In an explorative study with eight organisations, we observe their earliest phase of new product development during their participation in ideation workshops. So far, the differences of both perspectives seem to be smaller than expected. With research being ongoing, the ideation space at Thun castle functions as a learning lab and seems to be a promising research platform for further studies.

Keywords: Innovation, new product development, early design phases, iteration, prototyping and testing

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1 INTRODUCTION

As product life cycles continue to shorten and the pressure on innovations keeps rising, most companies do not question innovation per se but rather ask how to innovate more successfully. The success of innovations depends on several factors, especially on the early phase of new product development when user needs are identified and different product concepts are evaluated. This phase is characterised with ambiguity and uncertainty (cf. section 2.1), making it challenging and called the fuzzy front end of product development processes (PDP) (Kim and Wilemon, 2002).
This uncertainty in early phases of PDP might drive iterations. However, iterations can be perceived in at least two ways: With an engineering design perspective, iterations are an inherent and necessary phenomenon in PDPs to improve a forthcoming product's quality. With a management perspective, iterations consume resources, take time, and require a re-planning of developing activities, and are thus perceived as rather negatively connoted impact onto the business (cf. section 2.2).
Even though it remains unclear or rather multi-dimensional what iterations are, the approaches of prototyping and testing might mitigate on the one hand the risk of expensive and time consuming iterations in later stages of product development, and allow on the other hand gaining new insights about the forthcoming product very early in the PDP (cf. section 2.3).
In the long run, we aim at identifying how to align both perspectives on iterations and create better mutual understanding. As a first step, this paper aims at revealing more about iterations in early phases of product development, and to provide hints about the impact these iterations might cause. Thus, our guiding research question is: Which impact do iterations have in early phases of PDP? We address this research question in an explorative study with eight organisations, observing their earliest phase of new product development. The focus is on iterations during this earliest phase of PDP and processed by the whole team, not on iterations of single individuals.
The remainder of this paper is organised as follows. Section 2 overviews literature about uncertainties and iterations in PDPs, as well as prototyping and testing. Section 3 presents our explorative research approach, summarises the ideation workshops with the organisations (and their underlying concept), and introduces a coding scheme for the workshop progress. Section 4 depicts our results, separated in cycle deviations among all workshops, specific feedback-techniques during the workshops, participants' feedback regarding the workshops, and the workshops' impact on the organisations. The discussion in section 5 takes up the influence of the workshops' progress on the workshop-related feedback, suggests several means to reduce their cycle duration, and discusses the implications of additional data that shall be gathered. Section 6 concludes and gives an outlook for further research.

2 BACKGROUND INFORMATION AND RELATED WORK

2.1 Uncertainty in product development processes

Uncertainty is present in all areas of design and designing, i.e. products, processes, users, and organisations. And all these uncertainties make planning design processes harder by increasing the numbers and combinations of possible outcomes (Earl and Eckert, 2005). Hastings and McManus (2004) propose a framework for understanding uncertainty and their effects. Regarding uncertainties, they distinguish between

- a *lack of knowledge*, i.e. "facts that are not known or are known only imprecisely" but which can be collected or need to be created.
- A *lack of definition* exists if "things about the system in question have not been decided or specified."
- *Statistically characterized phenomena* are "things that cannot always be known precisely, but which can be statistically characterised, or least bounded."
- *Known unknowns* are "things that it is known are not known."
- *Unknown unknowns* are "by definition not known", and "some are hopeless to even contemplate" (Hastings and McManus, 2004).

These uncertainties cause various risks (or opportunities) and can be handled by different kinds of mitigation such as generality, upgradeability, design choices as well as verification and testing in order to "drive out known variation, bound known unknowns, and surface unknown unknowns" (Hastings and McManus, 2004). Furthermore, these unknown unknowns might cause iterations in PDPs.

2.2 Management- and engineering design perspective on iterations

With a management perspective, the stage-gate approach is a common standard to develop products (Cooper, 2008). This approach works well in a supplier-driven market but leads to problems in customer-driven markets, which have been emerging during the last decades. Product-life-cycles have shortened, and thus, the time-to-market for a next-generation/ new product development has to shorten continuously (Martinez et al., 2011). Other approaches such as Concurrent Engineering (CE) (cf. Kusar et al., 2004) and Simultaneous Engineering (SE) (cf. Hindson et al., 1998) aim at synchronising the sequential stage-gate activities in order to shorten the overall lead time. By the very nature of activities which depend on each other (cf. Eppinger, 1991), their synchronic performance leads to so-called iterations. Wynn (2007) identifies e.g. exploration, convergence, negotiation, rework, refinement, and repetition as different but non-orthogonal perspectives on iteration. Unger and Eppinger (2011) and Meboldt et al. (2012) distinguish between in-stage iterations and cross-gate iterations whereas especially the latter ones cause problems in reference to a previously announced market launch. These problems appear on the one hand as potential market launch delays ("If the technical departments could decide, when a product was ready for market launch, the company would be bankrupt before the launch happened" Meboldt et al., 2012), i.e. a renege on a promise, and on the other hand as disproportionately high resource consuming additional work. Thus, iterations in PDPs and their impact on organisations and processes are negatively connoted in a business driven context.
With an engineering design perspective, iterations can also be perceived as learning cycles with the opportunity to improve the product's quality. Ballard (2000) and Le et al. (2010) describe positive and negative iterations in design. According to Larman and Basili (2003), the earliest precursor of an iterative process is Shewhart's "plan-do-study-act" cycle series for quality improvement in the 1930s. In this context, early prototyping and testing seem promising approaches to discover the so-called "unknown unknowns" (de Weck et al., 2007; Hasting and McManus, 2004) as early as possible, and to learn about user needs, the forthcoming product and its production, in order to avoid costly pitfalls.

2.3 Prototyping and testing

'Prototypes' are representative and manifested forms of design ideas, whereas 'prototyping' is the activity of making and utilizing prototypes in design (Lim et al., 2008). Furthermore, Lim et al. (2008) distinguish two principles of prototyping: According to the fundamental prototyping principle, prototyping is an activity with the purpose of creating a manifestation that filters the qualities in which designers are interested, without distorting the understanding of the whole. On the other hand, "the best prototype is one that, in the simplest and the most efficient way, makes the possibilities and limitations of a design idea visible and measureable" (economic principle of prototyping). More broadly, prototyping might be led by the purpose of (1) understanding of the user's needs and experiences, (2) generating ideas (3), the communication among designers, and (4) evaluation and testing (Lim et al., 2008). Eisenhardt and Tabrizi (1995) are reporting a study which is indicating that "using an experiential strategy of multiple design iterations, extensive testing, frequent project milestones, a powerful project leader, and a multifunctional team accelerates product development".
If prototypes are utilised for evaluation and testing, they should embody design hypotheses and enable the designers to test them. Thus, framing design as a thinking-by-doing activity emphasises iteration as a central concern (Hartmann et al., 2006). However, even if rapid iteration provides value, it does not guarantee broad exploration (Dow et al., 2010). It might be more likely that the epistemic production of concrete prototypes enables unexpected realizations which a designer would not have unfolded without producing a concrete artefact (Kirsh and Maglio, 1994). If people build single prototypes, these individuals could seek validation for their ideas and disregard or fear the critique and feedback necessary for exploration and revision (Nickerson 1998). However, people react less negatively when they receive critique on multiple alternatives in parallel (Dow et al., 2010). Creating several design solutions may help both creators and critiquers to separate egos from artefacts. When asked for feedback, people provide more substantive critique when presented with multiple design alternatives (Tohidi et al., 2006). Designers often work in collaboration to generate, critique, and revise ideas, and to build consensus (Gerber, 2010; Schon, 1995; Warr and O'Neill, 2005). Creating several prototypes in parallel can help individuals to better understand underlying design principles, to enumerate more diverse solutions, and to react less negatively to feedback (Dow et al., 2010; Nielsen and Faber, 1996). However, the presence of a concrete prototype may focus the discussion on refining that idea rather than thinking more broadly (Cross, 2004).

3 RESEARCH DESIGN

We address the research question with an explorative research design by descriptive and analogue observations. First, we observe the earliest phases of PDPs in ideation workshops. Second, we collect the feedback of the workshops' participants directly after each workshop, and third, we interview the CEOs of the organisations to learn more about the impact of these workshops.

3.1 Research setting

Prior to an ideation workshop, the workshop sponsor (the organisation's CEO or equivalent in terms of responsibility and budget) and the workshop moderator meet for a briefing to create mutual confidence and manage expectations. They check whether a workshop is appropriate to the organisation's situation and its goals, and whether the organisation fulfils the requirements for participation (i.e. is there a willingness to scrutinize the status quo and to act upon that?). Based on mid-term challenges for the organisation, they formulate the organisations' specific workshop topic as starting point for the ideation workshop. As the workshop participants being the ones who produce the workshop results, they are selected among the broad occupational clusters of engineers and managers, and diversity in terms of education, gender, and experience. The sponsor's attendance during the workshop is prerequisite. The organisations and their workshop topics are summarised in Table 1.

Table 1. Participating organisations and their ideation workshop topics

Participants & orga.	Workshop topics
12 - Consortium "C"	For which clients and with which value proposition is "C" successful in 2020?
8 - Service "H"	Shit happens – mobile toilet systems
16 - Manuf. "T"	Individualising chimneys
14 - Manuf. "R"	Re-thinking office lightning
14 - Manuf. "S"	How can our machines reduce long change over times and incorrect handling?
12 - Insurance "K"	Mobile excitement 5.0
18 - Energy "B"	What else is energy?
14 - Manuf. "E"	What does our new [machine name] look like?

The workshop concept is based on the principles of user-centred design, iterative prototyping, as well as the need to take home the big idea tangibly. It comprises three phases (cf. Figure 1, top), aiming

1. at **identifying the 'right' question** by putting the user's needs at centre stage, i.e. creating a shared understanding of a topic, and enabling a goal-oriented working,
2. at **identifying promising solutions** to these needs by an iterative learning process, i.e. ideation, prototyping and testing (especially in this phase, uncertainty can be reduced by prototyping and testing/ receiving feedback, cf. section 2), and
3. at **getting things done** by preparing the companies' next steps for implementing these solutions, and calling attention to changes within the company based on the workshop outcome (see a detailed description in Heck et al., 2015).

The ideation space at Thun castle is chosen for the conduction of all ideation workshops in order to control the extraneous influences of space (Moultrie et al., 2007). It is a refurbished castle near the city centre of Thun, Switzerland, comprising seven rooms, as well as the environment of the castle itself. As the workshops are a metaphoric ideation 'journey', an airstrip leads from the *Welcome space* to the other rooms. Some rooms are dedicated to different places worldwide, i.e. the creative and all-time active *New York*, a *Mongolian yurt* for quiet working phases, and the relaxing *Bali* for breaks. Furthermore, a *Photo studio*, an *Atelier* for soft prototyping, and a *Machinery shop* for hard prototyping are available (cf. Heck et al., 2014).

Eight workshops were executed sequentially, each of them dealing with its specific topic (cf. Table 1). Their execution lasted each 2.5 days, except for workshop "T" which lasted 2 days, and was guided by 1 or 2 (out of 3) external moderators with experience as industrial designer, entrepreneur and innovation manager, or as a management consultancy's CEO, respectively. During the workshops, the participants were introduced a variety of tools by the moderator, as well as guided by his/her advice. Nevertheless, the choices of 'what to do next and how to do it' were taken by the participants. However, their decisions were mostly congruent with the moderator's advice.

3.2 Data collection and analysis

We collected data at three points of time. (1) During the workshops, we wrote a time log, including observations based on the AEIOU-framework (Martin and Hanington, 2012), and recorded the presentation-feedback-discussion-sessions. Thus, we collected data about the workshop iterations. (2) Directly after the workshops, the participants were encouraged to give feedback regarding their experiences and what they had learned during the workshop. We recorded the oral and qualitative feedback of the participants (this includes also the sponsor's feedback). (3) Weeks after the workshops, we conducted semi-structured interviews with the CEOs of the organisations. The interviews covered topics such as the product ideas, the team dynamics, methodological skills of the participants, and the impact of the workshop on the organisation.

The data analysis is based on the workshop recordings. We deduced a standardised description of the workshops' progressions, allowing us to apply the following coding scheme:

- **Working (W):** Participants work alone or in teams on specific tasks (being assigned the task by the moderator is included), generate or collect ideas, build prototypes, or prepare presentations related to the in-situ topic/question.
- **Presentation, Feedback, Discussion (PFD):** Participants present their ideas/ findings/ solutions alone or in teams, and get feedback from other participants (this feedback might also be structured with the outlined feedback roles further down) which might result in a discussion.
- **Break:** Time explicitly allocated for a break by the workshop moderator, e.g. a lunch break or a coffee break in the morning. Not included are individual breaks by single participants.
- **Input lecture:** Input about specific methods, process phenomena etc. by the moderator for all participants.
- **Warmup exercise/ challenge:** Short topic-unrelated exercises, e.g. to get the participants started in the morning or after the lunch break.
- **Organisational issues:** Smoothing the workshop progress (such as opening and closing on each day), harmonising different needs of participants, etc. – topic unrelated.

Ideally, each team can present its interim working results and gets feedback directly afterwards, followed by a discussion. Per our definition, a process "cycle" always begins with a working session (W) and ends with a presentation, feedback, and discussion session (PFD) (cf. Figure 1, bottom left). In between there might be a break, an input lecture or a warmup exercise. However, a cycle may start in the afternoon and end the next morning – in this case, we only calculated the workshop time for the cycle, not the real time (dinner plus sleeping time).

Furthermore, the feedback may be given through different feedback roles (Figure 1, bottom right). These roles shall help the feedback-receiving team to distinguish between the feedback itself and the person who gives the feedback, as well as supporting the feedback-giving person to argue through a specific perspective. We applied the three roles (1) *user's perspective* symbolised with glasses, (2) *I like, I wish* symbolised with a heart, and (3) *constructive feedback* symbolised by a hard hat.

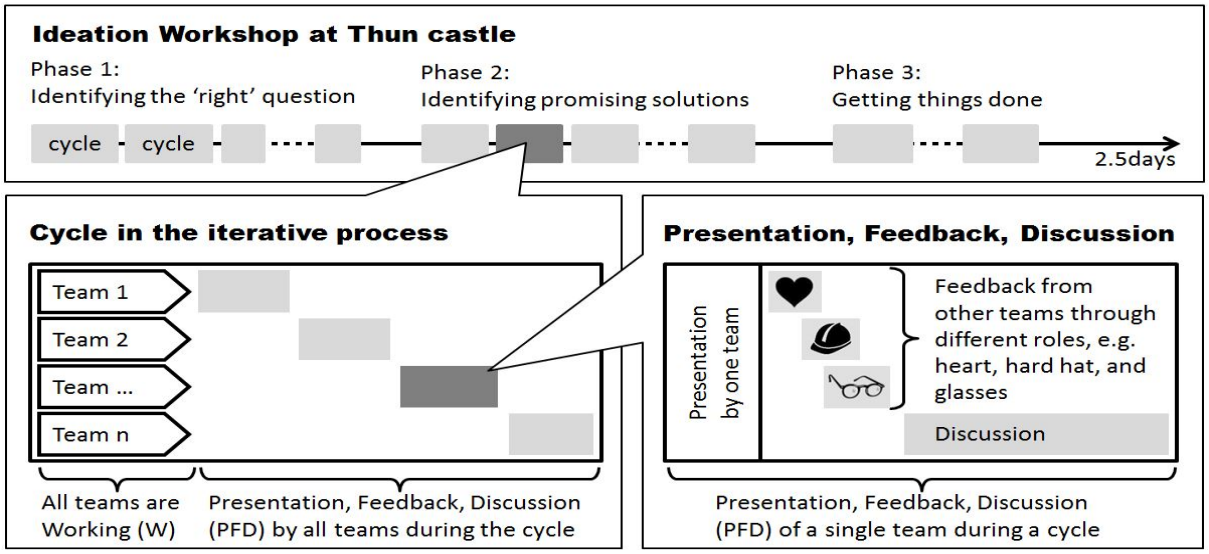

Figure 1. Iterative cycles in the ideation workshops

4 RESULTS

The results of our data triangulation are presented in four sections: Section 4.1 gives an overview over the cycle deviation among all workshops, whereas section 4.2 presents the differences in the feedback role application of two workshops in more detail. Section 4.3 summarises the participants' feedback directly after these workshops, and the interviews with the CEOs regarding the impact of such workshops are outlined in section 4.4.

4.1 Cycle deviation among all workshops

Figure 2 depicts the duration of each cycle in all eight workshops, titled according to the participating organisation, in the order of occurrence. The participants conducted between 12cycles (companies B, S, and R) and 15cycles (E, H), lasting between 16min (T) and 260min (R), respectively. The peak of company R in cycle eleven was a prototyping session affected by a lot of testing and idea refinements within the teams but without a moderator guided PFD-session.

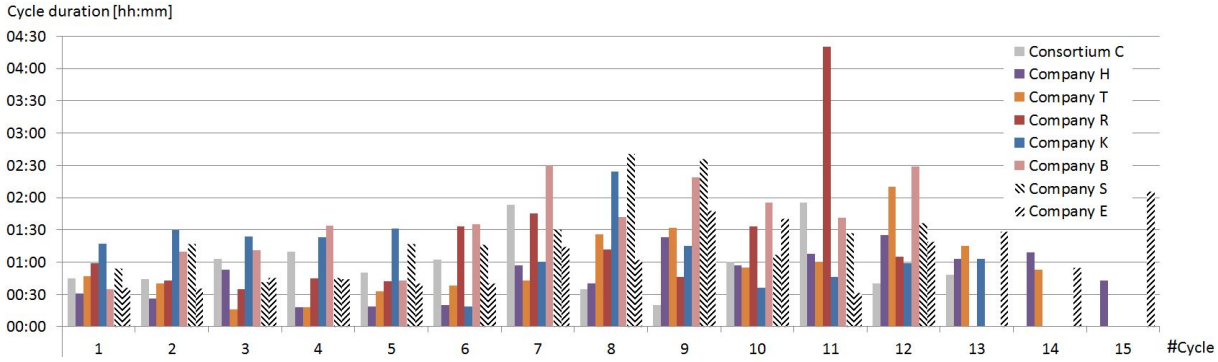

Figure 2. Duration of the iterative cycles during all workshops

Based on the coded time log, we calculate the mean duration of an iterative process cycle within each workshop (C_M), as well as the mean duration of the workshop-specific working sessions (W_M) and PFD sessions (PFD_M). Together with the number of participants (#P) and the number of iterative cycles (#C) per workshop, we calculate the correlations of these measures (cf. Table 2 left). Table 2 on the right shows the means and standard deviations of the measures over all workshops.

Table 2. Correlation matrix of the measures, means and (standard deviations)

	#P	#C	C_M	W_M	PFD_M
#P	1				
#C	-0.487	1			
C_M	0.670	-0.823	1		
W_M	0.634	-0.803	0.944	1	
PFD_M	0.478	-0.699	0.865	0.684	1

	M	(SD)
#P	13.50	(2.78)
#C	13.25	(1.20)
C_M	1:09:05	(37:40)
W_M	38:16	(29:09)
PFD_M	27:46	(14:32)

Although the number of participants (#P) only weakly negatively correlates with the number of iterative cycles (#C), it correlates with the mean cycle duration (C_M). Furthermore, the mean working duration and PFD session duration correlate with the mean iterative cycle duration (C_M), whereas the correlation of W_M and C_M is even stronger. In contrast to that, C_M is negatively correlated with the number of iterative cycles (#C).

4.2 Cycle deviation and feedback role application in two workshops

To figure out what determines the number of iterative cycles, we select two workshops with the minimal and maximal values regarding this measure (12 and 15cycles, respectively). As the number of participants (weak and negatively) correlates with the number of cycles, we choose two workshops with the same number of participants (Company S and E, both with #P=14) for further investigation. Coincidentally, both of them operate in the industry of machine manufacturing, and both of them had chosen a workshop topic dealing with problems regarding their current machines.

In both workshops, the feedback roles were applied during four PFD sessions, each in phase two only. However, company S finished phase one after three cycles, whereas company E went through six cycles. Furthermore, company S applied the feedback roles already in cycle four, whereas company E started using it in cycle nine. Figure 3 depicts the duration of the cycles in the workshops with company S and E, highlighting the working duration in each cycle grey, the PFD duration without the application of feedback roles white, and the PFD duration with feedback roles black.

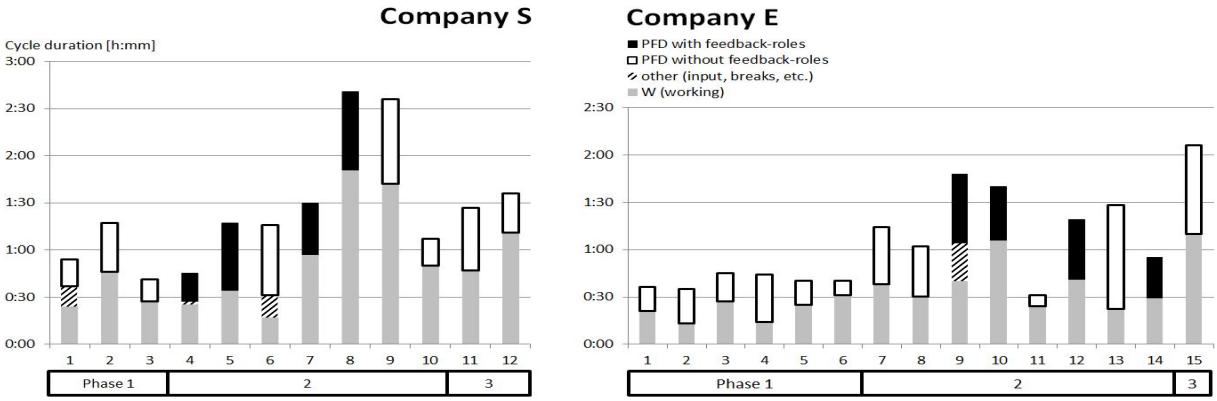

Figure 3. Feedback role application and cycle duration during the workshops S and E

Table 3 summarises the mean duration and standard deviation of W and PFD in the cycles of company S and E, distinguishing between the feedback with and without feedback roles within PFD sessions. In both workshops, the PFD sessions with feedback roles took longer than without feedback roles. However, the PFD sessions in the workshop with company E were shorter (on average) than in the other workshop – regardless of applying feedback roles or not. Furthermore, the working sessions in the workshop with company E were shorter. In total, company E spent over 8h on working, whereas company S worked 2h more. On the contrary, company E spent 5h on feedback without roles, whereas company S applied about one hour less on these sessions.

Table 3. Duration of Working and Presentation, Feedback, Discussion sessions in the workshops with company S and E. Mean (M) and standard deviation (SD) in [mm:ss]

Workshop	Company S	Company E
	M (SD)	M (SD)
Working	50:55 (29:01)	32:44 (15:59)
Presentation, Feedback, Discussion without roles	30:22 (13:47)	27:49 (18:04)
Presentation, Feedback, Discussion with roles	36:00 (12:01)	35:30 (6:32)

4.3 Workshop-related feedback of the participants directly after the workshop

We summarise the participants' feedback of company S and E regarding the workshops. The statements match and illustrate the working styles of the participants during each workshop.

The participants of company S said that they learned more about their customers; they invested their time well and will see what happens with the developed ideas; they are impressed by the amount of ideas and their concreteness; the output is satisfying, however the ideas are not rocket science; prototyping is needed to be creative; they gained new and valuable perspectives and learned more about their colleagues; the workshop concept is good and inspiring but the workshop efficiency suffered under its concept and the prototyping sessions (from time to time); the concept is creative but one should not overemphasise it; and the workshop could be repeated from time to time but not every two months. Especially, the COO of company S said: "*...if you are participating in a meeting or a workshop it is ideal to have less problems afterwards than beforehand. [...] Here, we are taking home three additional tasks – and we should think about our PDP, how we get all this through the funnel, now with three additional projects – that is what we have to solve. Personally, it was enriching, I have experienced a good atmosphere and the willingness to cooperate. However that is the same at other machine manufacturers – that is simply the kind of people working in such companies. [...] I'm fighting against myself for getting older and mulish – once again I'm confirmed that part-time working is not ideal for a machine manufacturer, neither home office, and in Germany I have no*

sympathy for the employee inventions act [ArbnErfG] because no single man can solve engineering problems. It's not possible. One has to communicate and that's not possible if some are at home or only work for two days – that's how a machine manufacturer works if he really wants to succeed…."
On the contrary, the participants of company E said they are impressed about the fast prototyping and the concrete outcome which they never have seen before; the crazy ideas and experience are the main points of these days; they learned about sequential and parallel working, and also the persona concept is interesting; it was good to speak that openly. Especially, the CEO of company E said: "*I'll take home a great team, I'm really proud of you. All of you did a superb job, and it was truly inspiring*."

4.4 Impact of the workshop on the organisations

As the workshops of the companies S and E took place quite recently, we wish to present interviews with CEOs of three other companies, whose workshops lie further back in time (cf. Heck et al., 2015):
CEO of company R: Six weeks after the workshop, the developed ideas got a go-decision from the management for the standard PDP. Furthermore, one idea will be staged on an important industrial fair in one year time. Within the company, the participants shared their workshop experiences and learnings with their colleagues. The CEO states for himself: "*For me, it was a great time, I also learned a lot. And I am grateful that we could participate.*" Furthermore, he recommended the workshops immediately to another company he is in close connection with.
CEO of company T: The expectations weren't really met – he was not aware that the workshop would only comprise the idea generation for new products, and not elaborate their PDP. During the workshop, the iterations were a bit too fast. Theory-inputs should be short but more 'applied'. The participants were not used to give and receive feedback. Nevertheless, the atelier and machine room were a "*paradise*", and all participants appreciated to achieve fast results by working together. Taking all into account, he would like to repeat the workshop in one day at the SME's site, and believes in two of four product ideas that will be developed further.
The CEO of a company which participated in a workshop prior to the data gathering reported in this paper: The workshop exceeded the expectations of all participants. During the prototyping sessions, the participants were truly in a state of flow and appreciated the positive spirit. They want to adopt some methods and integrate a prototyping room on their site in their PDP. The envisioned products will be developed further. Five months after the workshop, they are using their prototyping room quite frequently and conduct a workshop with an Italian company.

5 DISCUSSION

5.1 The influence of the process on the workshop-related feedback

There is a noticeable difference in the workshop-related feedback given by the participants and managers of the companies S and E. Company S is more critical and questions the workshop concept as well as the prototyping sessions (interesting to note however is that S used very much time exactly in prototyping) and the COO emphasised the increased workload ("*additional tasks*") that the workshops resulted in for the company. Company E is more positive and seemed to enjoy the notion of "*crazy ideas*" and the chance to speak openly. Also the statement by the CEO was brief and positive.
The reason for this must be looked for in the progresses of the workshops. There might be a link between the higher amount of cycles and the positivity of company E's feedback. More cycles gave company E the possibility to receive more often feedback. A higher frequency of prototyping and testing might be helpful for assessing unknown unknowns, and thus for a promising solution. Less cycles gave company S less opportunity to be confronted with these unknown unknowns.
A further presumption is, that since company S did not spend more than three cycles in phase one (compared to six cycles by company E), the idea about the user needs was less concrete and hence the feedback also turned out to be less precise. The drawn-out and irregular workshop-related feedback by the COO of company S might also be indicative for the company's general mode of operation (cf. section 4.3). Company S used more time in prototyping (W) than in testing and feedback (PFD) compared to company E's relatively equal distribution of its time, as one can see in Table 3. In summary it might be helpful for a company to go through more cycles, given that this provides more feedback and thus more chances to reveal unknown unknowns.

5.2 Approaches to reduce the cycle duration

In the following, we will hence discuss some ideas on how to shorten firstly the PFD sessions and thus, the cycle duration. As not all participants can speak at the same time, they have to wait until they can give feedback or discuss the presented ideas. This waiting time could be reduced by letting teams present synchronically, i.e. several teams present their ideas at different places (i.e. in different rooms) of the ideation space at the same time (only possible with an even number of teams). This measure could be leveraged by splitting the group of participants in even smaller teams (down to two persons per team), so that three (with 12 participants) or even four teams (with 16 and more participants) can present their ideas at the same time. It would be interesting to see whether the applied feedback roles could compensate the smaller amount of listeners per presenting team, as feedback would be given from several determined perspectives.

Further, the presentation's quality and duration could be improved by teaching the participants early in the process to focus on the 'why, how, and what' of their ideas, and thus to condense their presentation to a short pitch. This could also reduce enquiry calls as part of the discussions. Due to the communication-supporting effect of tangible prototypes, participants could be encouraged to prototype as early on as possible in the workshop progress.

If the PFD duration could be reduced, one has to decide what to do with the spare time: on the one hand, the cycle frequency could be increased, leading to more PFD (and W) sessions and therefore to more chances for altering ideas and the discovery of unknown unknowns. On the other hand, the frequency could be held constant or even decreased as to give time to longer working sessions; if it would turn out that more W is necessary to increase the workshop performance. In this case, parallel prototyping might be an option along Dow et al.'s (2010) finding that parallel prototyping produces better design results than prototyping serially. However, for a company it is not only important to generate as much ideas as possible but to identify the 'right'/'best' ideas for further development.

Moreover, the impact on the business results and the innovation capability of companies after participating in such an ideation workshop is an interesting and important research topic. For these variables and complementary ones we do not have adequate metrics yet (cf. Skogstad et al., 2009), but it might be interesting to derive them from the qualitative interviews we are conducting with the CEOs of the participating companies.

6 CONCLUSION AND OUTLOOK

This paper aimed at learning more about iterations in early phases of product development and to provide hints about the impact these iterations might cause. We conducted an explorative study with eight organisations and observed them in the earliest phase of new product development. So far, the results indicate that going through more cycles early on in the PDP might have positive effects by providing more feedback and thus more chances to reveal unknown unknowns. Furthermore, the differences of the management's and engineering design's perspectives on iterations seem to be smaller than expected. This might also be caused by the close collaboration of both occupational categories and the emerging team dynamics during the workshops.

Further research will investigate the impact of these workshops on the organisations in terms of PDP performance and innovation capability. The conducted interviews are a first basis for that. Even though we are at the starting point of our research about iterations in the early phases of product development, the ideation space at Thun castle functions as a learning lab and seems to be a promising research platform for further studies.

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