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INDUSTRIAL PRACTICES IN DESIGN BRIEFING – A SURVEY OF THE FINNISH INDUSTRY

Pekka Sipilä and Aleksi Kuitunen

Helsinki University of Technology
Machine Design
P.O. Box 4100, FIN-02015 TKK, Finland
Puumiehenkuja 2, Espoo
Pekka.Sipila@tkk.fi

Abstract
A clear and controlled brief is fundamental to the development of good creative work whereas sloppy or too complicated briefing wastes both time and money. Ideally, the brief converts the problem and requirements into meaningful package which leads to the effective and innovative solution. The main objective of this paper is to provide general information on briefing process in industry. The results showed that approximately a fifth of all companies have problems with their briefing process which can reflect to subsequent product development stages.

Keywords: Survey, design brief

Introduction
Managing the fuzzy front end (FFE) of the new product development (NPD) process is one of the most important and challenging task. FFE is the foundation of all NPD processes, while it determines the direction of any new product bath. During the FFE, some major decisions are made regarding “the market opportunity, the target customer, alignment with corporate strategy, and availability of key technologies and resources” [1]. Therefore, an effective execution of the FFE can directly contribute to the success of a new product [e.g. 2, 3, and 4]. FFE generally consists of product definition, idea generation, and product evaluation [5]. Product definition and idea generation are especially important while the most of the above mentioned key decisions and divergent searching for the possible solutions are made during these phases. In this paper, we focus on one integral part of idea generation the briefing process.

One main reason to fuzziness of these early design stages is that they are difficult to evaluate and control against progress milestones. For example in the case of idea generation, where in the beginning only physical deliverables are ideas and sketches of them, it is difficult to measure the amount of work completed and remaining on given task and on the project as a whole. Therefore, the guiding document for this process the design brief, which consists of all the important information on the completion and the limitations (financial, structural, and time limits) of the task, should be carefully structured.

Design brief

In systematic engineering design, the fundamental starting point of design process is the clarification of the design task [e.g. 6, 7]. According to Pahl and Beitz [7], the problem formulation is essential for the subsequent development process, therefore the task definition should be done as fully and clearly as possible. The problem formulation is a key component of briefing process. Briefing is a phase where knowledge is shared among the client and/or other related parties then this information is typically collected into a certain briefing document, which is called the design brief.

The brief outlines the problem and the required background information. It often includes three main aspects: technical, marketing and strategic component. In general, design brief includes contextual information, such as need statement, requirements list, and description of use context etc., which is found relevant for the design problem. Cooper and Press [8] came to conclusion that in order to produce an effective solution designer needs a wide range of information (both overt and tacit). Therefore the brief should contain the following: the design problem, design requirements, product attributes, consumer and market attributes, costs, budgets, timescales and background information of the company.

The main difficulty is that all these different 'voices' must be heard but simultaneously they might be conflicting with each another. Thus, tradeoffs between these multiple competing criterias must be made throughout the design process, often with inadequate information and under intense budget and schedule pressure [9]. The brief should function as a meaningful message between client or user and designer. Lawson [10] found in his research among architects that they preferred vague rather than too specific briefs but at same time briefs should concentrated on "strategic requirements". However for many engineering projects broad attribute requirements are fundamental starting point. Therefore, in conclusion, an ideal brief is open enough to enable creativity, but provide clear constraints where necessary. An exact structure of the brief depends on the design discipline [11] and the context (e.g. whether the customer is internal or external to the company or whether the assignment is concerning radical or incremental product development). Hence, there is no standard format for a design brief and all companies should develop their own brief formats [11].

Khurana and Rosenthal [12] found that most companies fail to generate clear and stable product definitions. Often the parts of the brief are in continuous movement or in developing phase once process is underway and found trend or research direction proves to be promising. This helps to build understanding of the different aspects of the task. However, at the first place the brief should generate a clear understanding of the direction and expectations of the output, not to drown designer in contradictory information and objectives. Another problematic matter is that design briefs have also found rather incomplete particularly in terms of the set of requirements [13]. Therefore, the majority of recent engineering research has concentrated in developing methods (such as QFD [14]) for identifying and/or forming a clear set of requirements [e.g. 15, 16].

Regardless of the obvious importance of design briefing process, there is relatively little engineering design research about the formulation of the brief. Whereas, in the construction or architectural context a considerable amount of research has focused on the actual briefing process. Observed problems seem to be to some extent similar as Koskela et al [17] states "planning and control are substituted by chaos and improvising in design". Koskela et al [17] continues comparing previous studies form 60's and 90's and it seems that nothing has changed. Still the most significant causes are of design problems are poor briefing, deficient

planning or resource allocation, and, a lack of confidence in preplanning for design work. Yu et al [18] has come to similar conclusions based on literature review regarding the problems associated with briefing practices. Most influential factors were: lack of a comprehensive framework, lack of identification of client requirements, inadequate communication between those involved in briefing and insufficient time allocated for briefing.

Based on the review of the previous studies managing the design brief is a challenge. Ideally, the brief should aim to achieve client objectives and be designed to provide more effective, efficient, innovative and better solutions [19]. Nevertheless, in practice the briefing process itself is a challenging problem because it is about making decisions in changing, unpredictable and competitive circumstances. Therefore, more information about practices is needed in order to improve the briefing process.

Methods

A survey was administered to Finnish manufacturing companies in summer-autumn 2004. This survey was originally designed to investigate the structuring and practices of the FFE phases on NPD. The questionnaire was divided into three sections: product opportunity identification, concept project launch, and concept development. There is already one publication reporting on the utilization of frond-end activities by Perttula et al [20] and another study concerning the utilization of concept selection methods by Salonen and Perttula [21]. In this paper, a third partial analysis of the data will be reported.

The companies were randomly selected from the dataset of National Technology Agency of Finland and/or OMX-Helsinki Stock Exchange. The selection consisted of 139 companies that have internal research and development activities. Forty-six (46) companies completed questionnaire. Thus, response rate to the survey was 33%.

The target group to whom the questionnaire was sent was chosen to be R&D managers or persons that had a similar role and knowledge on their procedures through these phases. The research method deployed for this research was an electronic questionnaire study, composed of a 110 multiple-choice questions. Questions incorporated mainly a four graded Likert scale (disagree, somewhat disagree, somewhat agree, agree) or multiple-choice questions. The survey was carried out at the Laboratory of Machine Design at Helsinki University of Technology.

Sample

For the purpose of this paper, stratification was performed using small and medium size enterprises (SME) and large companies as criteria. The stratification was in accordance with recommendations of the European Commission (2003/361/EC). "A small enterprise has a headcount of less than 50, and a turnover or balance sheet total of not more than €10 million. A medium-sized enterprise has a headcount of less than 250 and a turnover of not more than €50 million or a balance sheet total of not more than €43 million" [22].

The sample (see Table 1) covered mainly large and medium-size companies and there were only some small companies (4%, N=2). SMEs invested in average 3.7 percent of their revenue into R&D while large companies' percentage was 5.3. The higher rate of investment for large companies may be explained by some high-end technology companies, which all have between 10-20 percent their investment rate. A high standard deviation (SD 4.5) indicates the same variability.

The statistical analysis of the data was carried out using NCSS 2004. The tests of significance between SMEs and large companies were based on chi-square statistics (χ^2) and single factor analysis of variance (one-way ANOVA). The fourgraded Likert attitude score (disagree, somewhat disagree, somewhat agree, agree) was converted into responding numerical values (1,2,3,4) prior to statistical analysis. Due to the small size of sample in some cases Likert scales were converted into binary scales so that responses of 1 and 2 were coded as "1" (i.e. no) and responses 3 and 4 as "2" (i.e. yes) respectively in order to perform the statistical analysis.

Table 1. Details of survey sample (n=46)

Questions	N	%	Mean	SD
Size of the company (n=46)				
Large	28	60.9 %		
SME	18	39.1%		
R&D investment - % of revenue (n=39*)				
Large	23*		5.3 %	4.5
SME	16*		3.7 %	2.0

* Note some companies did not give any response to particular questions, causing varying respondent counts (n) for different questions.

Results and Analysis

The results are presented in three subsections: preparations for concept development, the briefing process and detected difficulties.

Preparations for concept development

Table 2 Actions before launching into the concept development

Survey item		Disagree %	Somewhat disagree %	Somewhat agree %	Agree %
Formal review procedures are applied for making decisions before launching concept development process.	SME N=18	6	28	39	28
	Large N=28	4	25	29	43
We make a conscious decision before moving into the concept development phase.	SME N=18	6	11	44	39
	Large N=28	4	14	36	46

Table 2 illustrates the proactive actions before launching into the concept development. Most of the all companies agree or somewhat agree to have formal review procedures to support decision-making. In addition, more than 80 % agree or somewhat agree to make conscious decision before starting the new product development phase. Overall, to the majority of firms

the starting of a new product development is at the outset a controlled and conscious procedure. No significant differences between SMEs and large companies were found (formal procedures χ^2=1.16 p=0.76 and conscious decision χ^2=0.01 p=0.92).

The briefing process

The results of the preparing activities to the briefing are shown in table 3. Approximately the fifth of all companies somewhat disagree in making schedules for conceptual design phase. In addition eleven percent of the large companies have no budget at all and equally near 40 % of SMEs somewhat disagree do have predefined budget for the conceptual phase. Furthermore a fifth of all companies either disagree or somewhat disagree to have human resources defined before starting concept development. These results had no statistical differences: schedule (χ^2=0.38 p=0.83), budget (χ^2=2.87, p=0.419) and human resources (χ^2= 2.26 p=0.52).

Table 3. Preparing and planning the briefing process

Survey item		Disagree %	Somewhat disagree %	Somewhat agree %	Agree %
The conceptual design phase is scheduled	**SME** N=18	0%	17 %	55 %	28%
	Large N=28	0%	21 %	47 %	32 %
The conceptual design phase is budgeted	**SME** N=18	0 %	39 %	39 %	22 %
	Large N=28	11 %	25 %	46 %	18%
Human resources are defined before launching concept development	**SME** N=18	6%	22 %	61 %	11 %
	Large N=28	0 %	21%	58 %	21 %

Basic reasoning in commercial firms is to deliver products on time and within budgets. Time is an interesting constraint, too much time pressure produces mental blocks [23], however according to Amabile [24] deadlines of an urgent project may also give impact that positively correlates with intrinsic motivation and creativity. In addition it has been stated that FFE phase can consume 50% of total product development time [25]. Therefore, it is interesting that when starting a new conceptual design phase so many companies disregarding the size are omitting or have insufficient plans with timing and resource allocation. This clearly demonstrates that the preparation to briefing is not completely managed. These kinds of neglects can direct companies to launch too many projects without regarding for the limited resources which can lead to higher time pressures and productivity drops e.g. in completing projects, longer times-to-market [26].

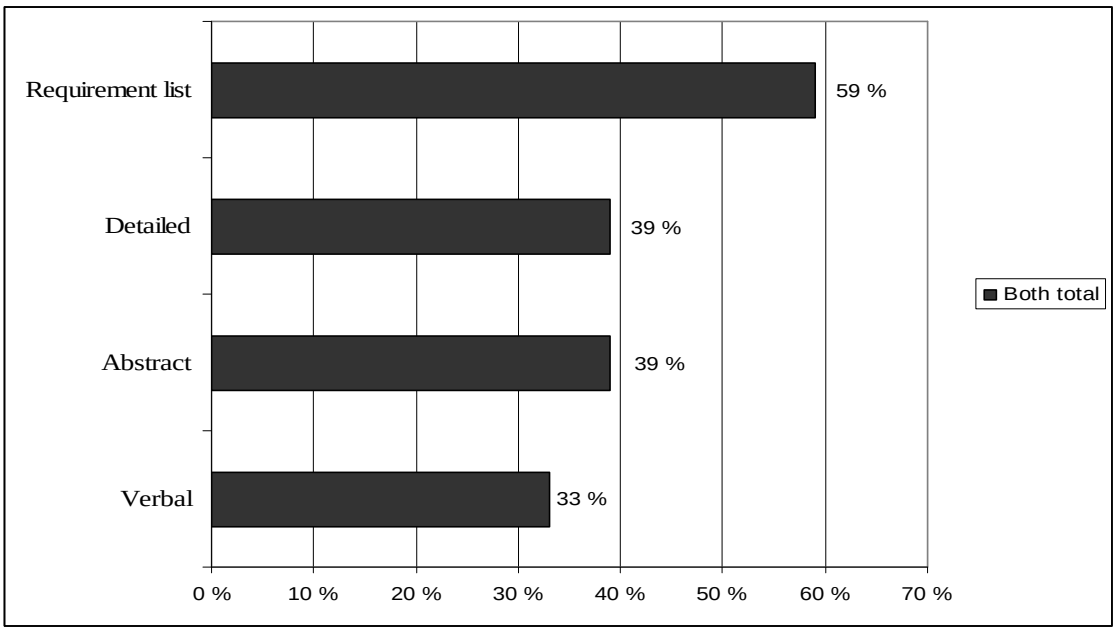

Figure 1. How is the design assignment formulated? (Select all aspects that task definition contains) N=46

Above figure 1 shows how design assignment is formulated. Requirement list is for all the companies most frequently used as a part of design brief. This can be interpreted as a correction movement to the results of previous studies where incomplete set of requirements have found as a bottleneck. The use of requirements follows the reasoning that the early adaptation of the established requirements is seen to assure that the final design satisfies the needs of all stakeholders, since the set of requirements determines which solution in a solution space is considered the best [27].

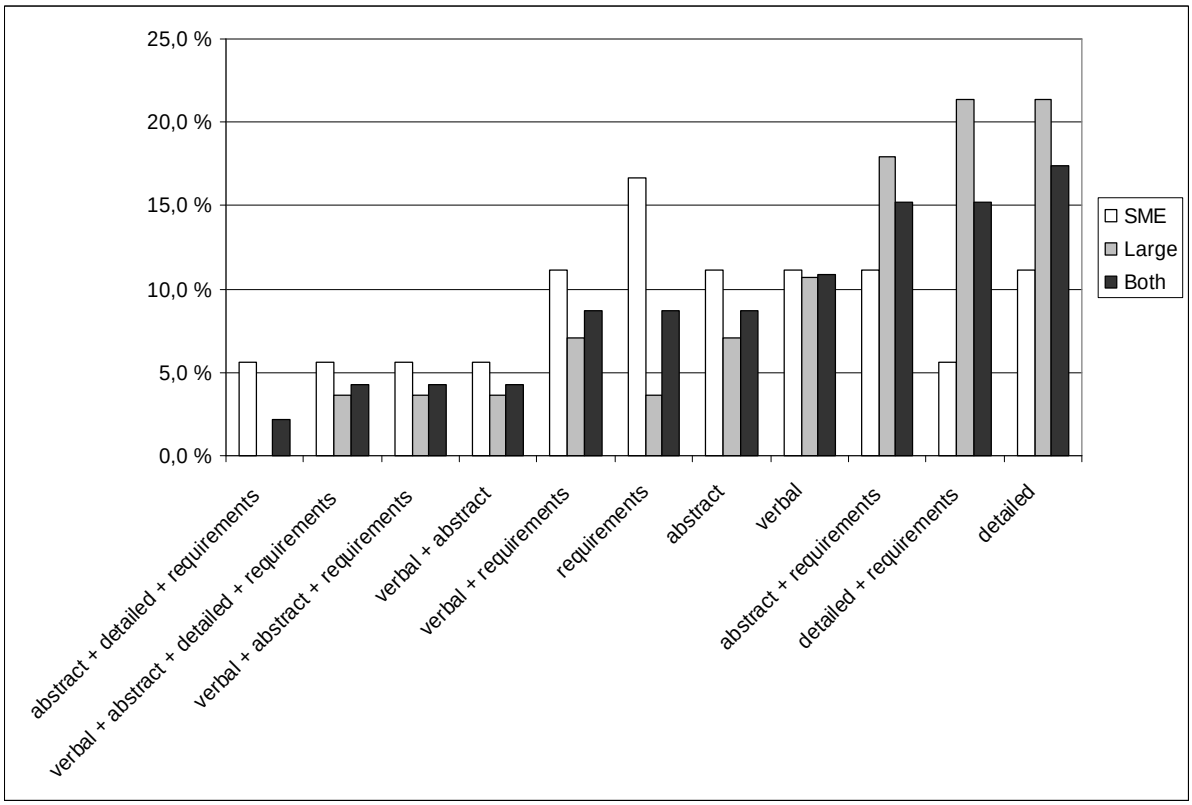

Figure 2. Combinations of brief structure are based on previous question: How is the design assignment formulated? (Select all aspects that task definition contains) N=46

Figure 2 above illustrates the proportions of the different combinations of brief structure. Large companies use most often solely detailed (21.4%) brief structure or requirements list accompanying with detailed components (21.4%) and secondly, a combination of abstract with requirements list (17.9%). Whereas interestingly 16.7 percent of SMEs rely on a brief that consists only on requirements list, followed by five different elements with equal percentage (11.2%):
- Detailed
- Abstract with requirements
- Verbal
- Abstract
- Verbal with requirements

The use of detailed components in brief can indicate that company recognizes its own operation modes and processes and through this detailed structure it strives for better control of the briefing and the ideation process. Interestingly brief structure combination of abstract with requirements is for both quite commonly used in practice. This latter finding particularly supports the idea of briefing being more open structured with strategic constrains [12].

Although percentual differences between companies are high, one-way ANOVA shows no statistical significance. Reason for this is small sample size per treatment group:
Requirements (16.7% vs. 3.7%) $F(1, 44) = 2.39$, $p=0.129$
Detailed with requirements (11.2% vs. 21.4%) $F(1, 44) =1.96$, $p=0.168$
Detailed (5.6% vs. 21.4%) $F(1, 44) = 2.15$, $p=0.15$

The type of information what the design brief contain is shown in Figure 3. There appears to be some emphasis variation in the brief content between small and medium size enterprises and large companies. Requirements and market potential estimation are for both the two most common information components of brief. The next is end user benefits and technical advantages for large companies while SMEs are more careful and consider financial goals and competitors and competitive products more important. Traditionally in Finland technology-oriented processes have dominated but at present more user-centered processes are in use. It is clear that simply following the technical opportunities and hoping that the created technology will find a market need is high risk gambling. To minimize the risk companies are responding to the feature requests which their customers give them or companies act proactively by doing surveys of their customers to find what they want and what are their actual needs. Large companies naturally have better resources than SMEs to carry out extensive quantitative surveys.

Platform and description of form are in average least utilized information object. However, logically platforms are used when available which can be seen in large companies response (46%) whereas platforms are still quite unusual among SMEs. Therefore, one-way ANOVA showed significant difference between groups for including platforms ($F(1, 44) = 6.88$, $p=0.012$) in design brief. Other information parts were patents, regulations and technical standards. There were no other statistical differences found between factors.

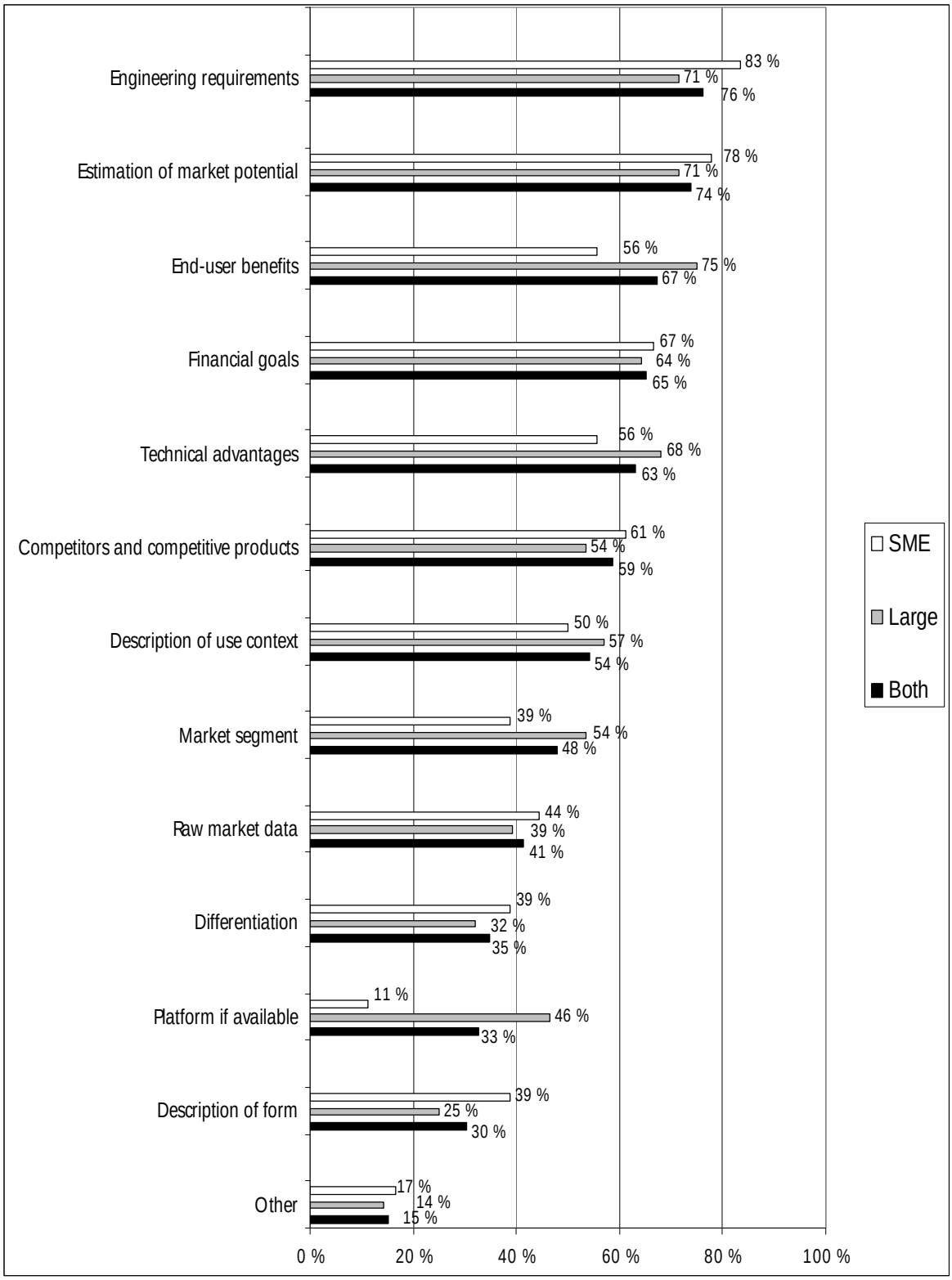

Figure 3. What type of information does the task definition contain? (N=46) / What type of information does the brief contain?

Detected problems

Table 4 contains two questions about difficulties relating to briefing and idea generation. Most of the companies have clear and explicitly defined goal of concept development for their

product development personnel. Still approximately a fifth of all companies disagree or somewhat disagree to accomplish to perform this basic definition. This result is consistent with previous finding that companies have problems to generate clear product definition [13].

Table 4. Detected problems

Survey item		Disagree %	Somewhat disagree %	Somewhat agree %	Agree %
The goal of concept development projects is explicitly defined and clear for all parties engaging in the development effort?	SME N=18	6%	22%	61%	11%
	Large N=28	4%	14%	68%	14%
It is common that product configuration changes during final development stages because of improper/poor specification or concept testing.	SME N=18	6%	44%	33%	17%
	Large N=27 *	15%	41%	18%	26%

* Note one company did not give any response to this particular question.

In addition the half of SMEs and 44 percent of large companies agree or somewhat agree to make changes to product configuration during the final development phases because of improper specification or concept testing. Downside of these late improvements is that once a product has entered in to the actual development phase the engineering changes are time consuming and costly [4]. Both of these results clearly strengthen earlier findings that early phases are not completely managed. No significant differences between SMEs and large companies were found for either clearness of the concept goal (χ^2 =0.63 p=0.42) or configuration changes during final development stages (χ^2 =0.13 p=0.71).

Discussion

The main objective of this paper was to provide general information on briefing process in industry. The results showed that most of the companies are managing their briefing process. However approximately the fifth of all companies have difficulties which partially reflects to the later product development phases. Primary reasons for detected difficulties were insufficient scheduling and resource allocation at the briefing inception stage.

To improve further the briefing process the brief can be used as tool to evaluate a design during the development process [e.g. 11]. This extends the purpose and function of the brief beyond a checklist. However the main challenge for briefing remains effective information processing. The generating of brief involves wide gathering, analyzing and synthesing of information [9]. Thus it can be complicated to combine all different sources of information into powerful brief that inspires designers rather than restrain their creativity. After all, briefing is as Barrett et al [28] states highly dependent on experience. They found that in construction industry a pragmatic experience is key driver which is applied and adapted to managing briefing process. Therefore also in this paper found briefing problems may originate from the lack of experience. To overcome this reliance and to increase transparency more research is needed in order to develop systematic and structured methods for briefing process.

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