THE FINAL OUTPUT OF THE FRONT END INNOVATION PROCESS

"What key requirements should be included in the conceptualization phase of the Front End Innovation process to enhance a Go decision for further product Development?"

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ABSTRACT

The Front End of Innovation process is the early phase in the whole innovation process. With a right handling during this stage high risks and costs for the development of a product can be avoided. One method of the Front End of Innovation is the Lead User Method, which covers radical innovations. Since it is established as a method for the Frond End of Innovation process, its steps are crucial for entering the development stage. This is difficult to achieve without a good product concept, with which the decision makers can be satisfied in order to permit the realization of the solution. The problem is that there is limited if none attempt made in literature to discuss the conceptualization and by this the final concept of the Front End of Innovation. In this research guidelines and methods are studied, which combined can provide a successful concept and enhance approval by the decision makers. These findings are based on information provided by online sources, case examples and related literature. The focus lies on the cooperation between 6 established guidelines giving a structure for the concept, pre-prototype methods, differentiated by low-fidelity and high-fidelity prototypes, and final presentation methods for a successful storytelling and persuasion. The aim of the paper is to help firms with realizing the product innovation with less risks and uncertainty. The methods elaborated on in this study are meant for radical products, since the Lead User Method is discussed.

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1. INTRODUCTION

The rise of globalization and development of technology led not only to a change in customer needs but also to an extreme high competitive market. Companies face more challenges in operating their business and are forced to steadily innovate products or processes in order to compete and to survive the high competitiveness. Aspects like the global wide transactions in products and services, the ease of money transitions the rapid development of technology, caused a fundamental transformation in society and decreased the knowledge gap of people (International Monetary Fund, 1997). The mindset of customers is changed and they have access to information they need in order to decide and overweigh options when deciding for a product or service and to compare the companies. This awareness of possibilities for the consumers enables them today to actively take part in the process of meeting their own needs. That is the reason why more and more firms are switching from the traditional innovation strategy to a more customer-focused process. More firms get their new product or service ideas collected from their current or potential users (Lilien, et al., 2002). With this new way of operating, they try to fight the intensive innovation costs and risks. Companies seek to include their consumers in their strategy in order to be able to meet their needs as successful as possible and to use their feedback and ideas for improvements. With the increase in including external sources for the innovation strategies, the Lead User method has risen. This method is about the collection of information regarding needs, improvements and especially solutions from users at the leading edges of the market. Lead Users (LU) are people who are experiencing problems in their own area of expertise or even hobbies and strive for a solution to their problem. Lead Users are ready to cooperate with each other and firms e.g. in order to create radical solutions. These users have shown to be the actual developer of most of the successful new products where the commercialization on the other hand was done by manufacturers (Urban & von Hippel, 1986).

According to van Hippel and Urban (1986) those being ahead of the trend can tell and forecast what should be done or changed by the market in order to meet the needs and forecast what the consumers demand in the future. The ability to find out what consumers need and what problems exist before the market realizes it and professions enable LUs to provide information and ideas for a better solution than otherwise might have occurred. They can then communicate the information to the business functions like R&D, marketing and supply and later use the information for products or services entering the mass market (Lüthje & Herstatt, 2004). This change in the business strategy can benefit an organization with more efficient breakthrough innovations, higher product or service quality and by this increase the revenues and return on investments. Moreover with including the information, which LUs can gather in the Front end of Innovation process, more risk can be avoided since more influence regarding costs and failures of the product life cycle can be made in the early innovation stages (Machac & Steiner, 2014). It is proved that LUs have developed particularly in areas like the semiconductor process machinery or scientific areas most of the commercially product innovations (Urban & von Hippel, 1986).

Eric von Hippel dealt with the idea of the Lead Users and created a 4-step methodology for concept development and testing in which lead users are integrated in the market research process.

This notion of user involvement in innovation is based on (Von Hippel, 1976):

1. Specify Lead User Indicators;
2. Identify Lead User Group;
3. Generate Concept (Product) with Lead Users;
4. Test Lead User Concept (Product) .

This model is further discussed in the theoretical framework later in this paper.

With the help of the LU-method and especially the contribution of von Hippel towards the effectiveness of the LU in businesses, many companies achieved breakthrough product or service innovations which showed to be successful in the market. Examples of companies and their LU-innovations are Philips, Verizon, Nortel, Kellogg, Pitney Bowes, Nestlé, Gillette, and Cabot (Eisenberg, 2011) and also LEGO (Hienerth, Lettl, & Keinz, 2014).

After the introduction of the idea of a Lead User by von Hippel much research is done on the LU-method, which led to huge amount of information on this method and the methodology of Eric von Hippel's model. These findings give information on the LU method and its process, but the problem here lies in the last step 4, the conceptualization phase, which does not provide a clear description of what a final concept actual comprises. In the conceptualization phase, as mentioned in existing literature, the planning of a workshop with lead users and employees is included as well as the development of ideas and the documentation and evaluation of the established concepts (Lilien et al., 2002). Here aspects like the involvement of company staff, intellectual property regulations and a basic sketch or model of the developed ideas are mentioned. Nevertheless, it seems that there is unfortunately no clear description of the last stage in the FEI ('the concept of the idea'). There is no clear description of how exactly such a final concept and by this the final Front End output should look like. In this paper the analyst's goal is to find out how the data gathered by the LU can be successfully translated into the last phase of the LU method and to ensure a successful development and implementation in the target market later. Relevant questions one should bear in mind are e.g.: 'What requirements does the concept stage need and how should it look like in order to attract the management and other decision makers?'. This question is critical since according to Kristel Dewulf (2013) the final output affects the go/ no go recommendation for further development in the New Product Development phase. This means that early in the innovation process, which is the Front End, the decision on whether to invest and develop the product can be influenced. However these steps and examples mentioned in literature, which focus on the LU-method, unfortunately do not provide detailed and actionable steps in order to support the LUs, since it is not easy in this high competitive and dynamic markets to win trust (Judge et al., 2014). But what exactly should be done to overcome this barrier and pursue an efficient concept for the outside world and to impress decision makers and investors?

This paper deals with this issue; the lack of information regarding the end stage of the Front End of Innovation process and, by this, the LU method. The goal is to find possible methods and forms of such a concept since they are critical to start the next process the 'New Product Development'. The chance to get the necessary funds to continue with the commercialization of the concepts created by the LUs and also the go decision for further development depend on the final concept.

Research question:

'*What key requirements should be included in the conceptualization phase of the FEI process to enhance a Go decision for further product Development?'*

For this research innovation related literature is used and information sources like websites and blogs and cases of

organizations, since there is no available scientific literature covering the structure and form of concepts.

2. THEORETICAL FRAMEWORK

As mentioned earlier there is limited none attempt to fully deal with the conceptualization of the final stage in the LU method and by this the Front End of Innovation. Most literature dealing with the LU leave out details about the concept. This research also showed that not even companies implementing the LU method provide much information on their concept methods. In order to successfully answer the research question and to find out how such a successfully concept might look like, literature, blogs and websites about concepts in general are covered and applied to the LUs final concept. To strengthen this research, different aspects that can be considered in the conceptualization phase are covered like design methods of the product and presentation methods in order to achieve confirmation by the decision makers. The focus here lies on radical innovations, since we cover the LU method.

In the next part some important concepts are explained in order to gain an understanding of the Front End of Innovation and LUs and to understand the background of this paper. This section covers literature regarding the FEI and its concept is considered from an information processing perspective.

2.1 Frond End of Innovation

The Front End of Innovation is the first of the three phases of the whole innovation process. The Front End of Innovation is followed by the New Product Development phase and the commercialization phase which is illustrated in Figure 1 below.

The Front End can been seen as the characterization of the problem development and the first stage in the innovation process. The FEI is also called the Fuzzy Frond End of Innovation. This is because at this starting point the product concept is very fuzzy and here the innovation process might be uncontrollable (Dewulf. 2013). Nevertheless there are several terms to call this early stage in the innovation process (Kola-Nyström & Koivuniemi 2005). In this paper the term Frond End of Innovation 'FEI' is used. In this early stage of the innovation process new business opportunities can be found and analyzed.

According to Koen et al. (2002) the FEI covers the activities that need to be performed before entering the New Product Development and Commercialization phase. Compared to the NPD the FEI is more unstructured and chaotic. According to Khurana and Rosenthal (1998) the FEI process is finished, when the innovation got the funding and the permission for further development or when is decided that this will not be the case. Figure 1 is based on the FEI model of Koen et Al (2002).

As is illustrated in the Figure, the FEI includes 5 elements.

1. Opportunity identification

The opportunity identification entails the opportunities that the business aims to pursue. The opportunities can differentiate between a new direction for the business or an upgrade to an existing product. Examples are new service offerings or new product platforms. Methods that can be used during this process are brainstorming, mind mapping and lateral thinking as creativity tools and causal analysis, process mapping and fishbone diagrams for problem solving techniques.

2. Opportunity analysis

Opportunity analysis includes trend analyses and information regarding competition. Here it is relevant to translate the identified opportunities into the business and technology ones. Aspects influencing the level of importance of the opportunities and effort made for their analysis are e.g. the alignment with the business culture and strategy, risk tolerance of the decision makers and size of the future development effort.

3. Idea Genesis

Now it is time to translate the opportunity into a clear idea. The idea is not ultimate, since it may change several times due to combinations, reshaping and modifications. Furthermore in this step the business can cooperate with external parties like costumers and institutions.

4. Idea selection

In the idea selection step the ideas, which seem to provide more value to the user are chosen and transformed into more concrete ones. Within this activity direct contacts with users and collaboration with external groups like other companies are not

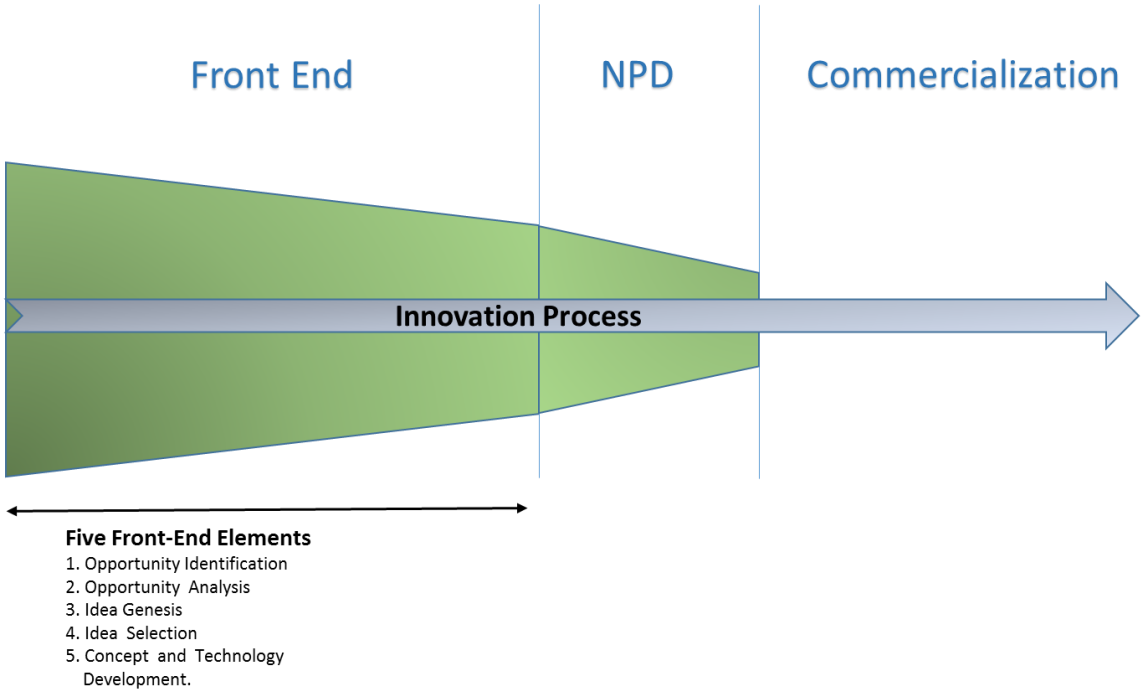

Figure 1: Five Front-End Elements and the innovation process (adapted from Koen et al. (2002))

rare. In order to achieve the new or improved ideas for the opportunity identified in the step earlier, techniques like brainstorming and idea banks can be used again. Nevertheless, a real financial return in the FEI is still a guessing since this is an early stage process and many changes and events can occur.

5. Concept development

In this stage the product concept is made, which is critical for the decision makers, who have to decide whether to continue with the solution in the New Product Development phase or not. The business case is developed, which is based on information regarding costumer needs, investment requirements, competition assessments, unknown technology, market potential and project risk in general.

In order to reduce the fuzziness of the FEI and to enhance a good communication the 5 elements of the FEI by Koen et al. (2002) should be addressed and approached well, which leads us to the next part and the role of the LU method within the FEI process.

2.2 Lead User method and its role in the FEI process

The LU method is created by Eric von Hippel. With this method von Hippel aims at providing a tool for a better FEI process. The LU method deals with LUs, who are the main actors in this process. The difference between other innovation methods and the one of von Hippel, is that the whole process starts and aims at identifying the problem / gap in the market and reach a solution to this problem. The LUs work on parts of the problem and try to solve it during the LU steps (Churchill, von Hippe, & Sonnack, 2009).

2.2.1 Lead Users

Typical users are living in the present, the now. Their view on needs and solutions is constrained by their own experiences. This causes that the cooperation with them might not really generate radical innovations beating familiar ones (von Hippel & Riggs, 1996). In this case it is better to consider the LU method. The difference with LUs and typical users is that their needs and views might be the same like the other ones, but they differentiate in that they are additionally familiar with problems and conditions existing in the future. According to Eric van Hippel (1986), LUs show two characteristics: (1) LUs see the needs and problems of a marketplace far earlier before the marketplace recognizes them and (2) they seek to find a solution to the gap in order to benefit (von Hippel, 1986, 1988). Furthermore LUs are experts in their field and can provide more experiences and by this accurate data and market research information for opportunities (von Hippel, 1986). Another advantage of lead users is that they try out their solutions and ideas by themselves and by this make the experience, which is relevant for the final development of the idea (Matzler & Bailom, 2007).

What is important to mention and what should not be misunderstood is that LU are not the same as early adopters as illustrated in Figure. 2. In Figure 2, one can see the LU curve. As can be seen, LUs are ahead of the market relative to other categories of market players. While early adopters are the first people buying the new products or services, LUs realize the needs and new products before they are even produced or realized by other groups (Churchill, von Hippel, & Sonnack, 2009). The difference is also that they have the capabilities to develop the necessities to meet the needs and to generate the solutions of the early adopters, routine users and laggards. For example, novice designers can be LUs and focus mostly on the problem development and the solution development (Devon & Jablokow, 2010).

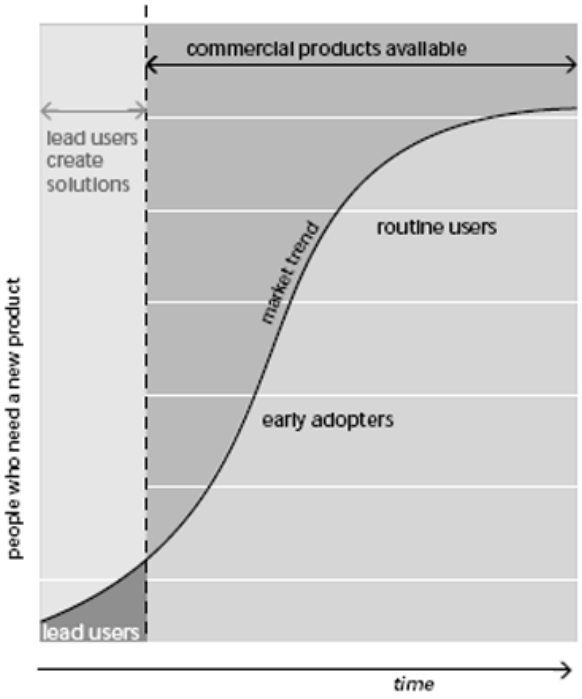

Figure 2: The Lead User Curve (von Hippel, Thomke, and Sonnack, 1999)

There are several companies that implemented the LU method in their business operations, claim that through the cooperation with the LU they faced less risks and failures that might have come up later in the product life cycle (Keinz, Hienerth & Lettl, 2012) (von Hippel, 1991).

Eric von Hippel found a way on how to include Lead Users in the innovation process, especially in the FEI process. According to von Hippel (1986) there are 4 steps that need to be accounted for to utilize Lead Users in the market research.

1. Identify an important market or technical trend;
2. Identify lead users who lead that trend in terms of a) experience and b) intensity of need;
3. Analyze lead user need data;
4. Project lead user data onto the general market of interest.

When comparing these steps with the LU method of von Hippel (Figure 3) one can see the importance and the role of a LU during the FEI.

In Step I the whole process starts and the main important task here is to prepare for the project and to specify the characteristics and goals of the LUs, which they need to imply in order to join the project. The target market needs to be identified with a team. Step II consists of interviews, surveys and scanning's of information and data that needs to be executed in order to identify needs and trends in the market. In the next step, Step III, the main focus is on identifying the right LUs for the project after the characteristics of the LUs are manifested and the trends are identified. Here market data is collected as well for the business case after the identification of potential needs and problems. The needs and data that are identified here are then presented to the management. The last stage, which is the conceptualization stage of the LU method, covers the aspects of improving or generating new product concepts. Workshops will take place with LUs and other employees and relevant players needed for the project and

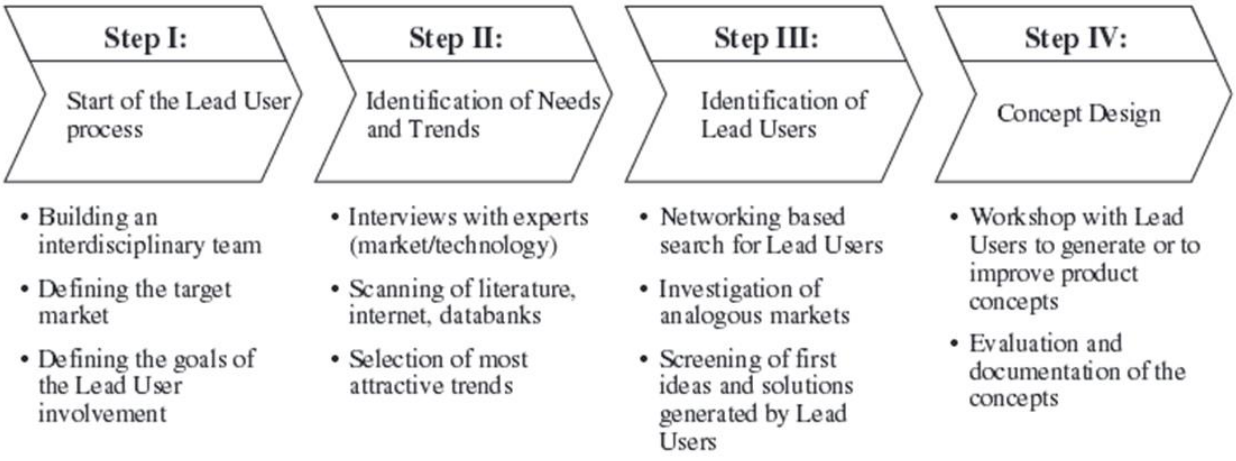

Figure 3: The Lead User Method (Lüthje et al., 2004)

together they establish the concepts. Afterwards those concepts will be evaluated and documented (von Hippel, 1991).

3. IMPORTANCE OF THE CONCEPTUALIZATION PHASE

Since the conceptualization phase is the final stage of the FEI according (von Hippel,1986), it is the final work that contributes to the decision on whether to continue with the idea or not and to finally commercialize it. Furthermore the motivation for innovation is often a high expected profitability. That is why the concept of the radical innovation needs to be transparent and include aspects that help a successful product development and avoid uncertainties. Especially uncertainty plays a critical role here. The level of uncertainty can be different between different innovations but nevertheless especially in the early phase of the innovation process, the FEI phase, the impact to decrease uncertainty in later progresses is bigger (Trott, 2005). The reason is that customers and/or LUs are included in this phase as an information source and this enables valuable ideas and insights that can help reducing uncertainty in later stages (Lüthje & Herstatt, 2004).

3.1 What is known about conceptualization and concept in existing literature?

3.1.1 Conceptualization

According to von Hippel (1991) in this stage the identified LUs will be brought together in a concept generation workshop in which tests can be done in order to choose for the best suited LUs. Those chosen can work together with other groups of the firm like employees, engineers and or manufacturer in order to go on with the conceptualization phase during the work shop. The people finally joining the workshops need to make an agreement that all the information shared and ideas generated during the workshop are the property of the company. What is really interesting is that most of the players in the workshop valued their participation in the workshop so much that in some cases like in the case of the company Hilti, they did not accept any honorariums (Herstatt & von Hippel, 1991). Their own contribution in such a big project plan and towards a new product/ service, which might be a breakthrough innovation, increased their commitment to the job and was a reward as such (Lüthje & Herstatt, 2004).

During the workshop days the group first makes reviews of the trends and problems they found out together and subgroups tackle those and divide the tasks among them. For a better and more efficient idea generation it is possible to switch the groups meanwhile in order to cover the ideas and creativity of all in each element and to avoid the danger of premature fixation (von Hippel, 1991). In the case of Hilti the group in the workshop built a better trust and comfort among each other and achieved a better interaction. This was due to the implementation of group activities in which they get to know each other (Herstatt & von Hippel, 1991).

Now the final phase of the workshop begins. All the ideas of the groups or subgroups will be presented to each other in order to get feedback. By this they come up with the best concept that would then be presented to management and other funding bodies. During the feedback session aspects like the novelty and originality of the solution, the realization and other aspects can be found out. When the best solutions are chosen, all people will be divided again to those concepts and first drawings can be created. Last but not least again the best concepts will be analyzed and improved and transferred into one final concept by the group (von Hippel. 1991).

Even though von Hippel mentions the final concept and even though a concept varies and depends on the company and industry and the goal, still it is not clear how a concept could look like and what it might need to include when presented to outside parties. Should it be easily understandable and short or detailed and with full of technical terms? What is relevant to include in the concepts that could apply for any kind of organization in order to ensure a higher chance to succeed?

Koen et al (2001) have a different description of a conceptualization. They state the conceptualization phase includes developing a business case, which relies on information about the "market potential, customer needs, investment requirements, competitor assessments, technology unknowns, and the overall project risk". Whereas Koen et al. (2002) link the business case with the conceptualization, von Hippel includes it in step I and III of the LU method. The preliminary "business case" starts in step II. The finalization of the business case will then be created after the generation of the final concept (Churchill, von Hippel, & Sonnack, 2009).

A simple description of conceptualization can also be the process in which concepts are developed. Here after the selection of the concepts the clarification of the concept is done by defining and interpreting the meaning of it. The conceptualization process is not easy and time demanding but on the other hand an intellectual reward can be achieved afterwards (Evans, 2002). According to van Breemen and Sarbo (2008) conceptualization processes aim at achieving a shared, common understanding of a problem. This

needs to be done in a way that stakeholders can understand and value the intention. Mueller (2004) defines conceptualization as the process of agreeing upon the meaning of terms. In this process the meanings are specified by describing the indicators that are used to measure the concept and its dimensions.

3.1.2 Concept

According to the Business dictionary (n.d.) concept can be a briefly stated clear idea that is organized by an ad or a marketing campaign when looking at the advertising aspects. Relating the product development aspect it states that a concept is:

"A clear, detailed description of the attributes and benefits of a new product that addresses the needs of the targeted customers and the reasoning behind the idea, strategy or proposal with particular emphasis placed on the benefits brought by that idea" (Businessdictionary, n.d).

Examples mentioned are designs for a new automobile or a pitch behind an advertising campaign.

According to Jackendoff (1989) a concept can be seen as "entity within one's head, a private entity, a product of the imagination that can be conveyed to others only by means of language, gesture, drawing, or some other imperfect means of communication".

As one can see in the definitions a concept especially within the product development seems to be an entity like an idea in someone's mind that should be clearly defined, clear on its benefits towards targeted customers and provide information on the strategy as well.

Keinonen and Takala (2006) state that such a conceptualization should meet requirements like details in the specifications, the precision of those specifications and elements and the compatibility with production. Only then the product will be economically viable. Nevertheless, for an efficient concept it might not be enough to only have the specifications and the other elements mentioned above. What also should be considered when creating the concept are aspects like the required resources and input the business needs to consider when implementing the idea. Type of inputs are e.g. people (the amount of workers), materials, money and time for the whole process. Furthermore the firm should be aware of its technical ability to ensure they can indeed put the idea into reality. How this aspects can be included in the concept is discussed in the next part. The next chapter deals with the methodical part of this study. For this part I searched for scientific sources, but unfortunately they do not provide enough information on concepts and their basics. Therefore the findings are predominantly on findings published on websites and blogs and in business and engineering literature. Furthermore examples of organization and their concepts are used to give an overview on how a concept might look like in the LU method. The methods also have their root on ideas made in business concepts as well, since the main idea behind a concept has no real difference between a business idea and product idea in my opinion. Both need to attract people and create benefits.methodical part

This part first covers the 3 dimensions of a concept established by Crawford and Di Benedetto (2010) to show the 3 main criteria's each concept should halt followed by six guidelines for the structure of a concept. Furthermore ideas on product design methods and presentation methods are elaborated as a last step. These are tools that can be helpful for creating a good concept, in order to achieve success in innovation strategy and to avoid any wasted time, costs and risks that could happen to every business whether car manufacturers or clothing industry.

Before starting, it is important to mention that one of the main factors in my eyes is the awareness of the unmet needs and knowledge of the actual problems, the business is facing. It has to be ensured that there is a good communication between the first step in the LU method and the last one, since the problems should be identified in the beginning and LUs should not lose the track in order to achieve the solutions actually wished by the client.

3.2 3 Dimensions of a concept

One of the few studies found for this research, which covers product concepts is the one of Crawford and Di Benedetto (2010). They stress that a product concept need the compliance of 3 dimension, which are the form, the technology and the need/ benefit. The contempt of any of these aspects cannot lead to a product innovation, since they depend on each other.

1. Form

Within the innovation of products, the form is seen as the physical output. When addressing the development of services, this includes the process by which the service is created.

2. Technology

Technology is the tool, which enables the creation of the form. Mostly there seems to be one technology option depending on the case.

3. Need/ Benefit

According to Crawford and Di Benedetto (2010) a product is only then valuable, when it benefits to the users.

The alignment of the 3 dimensions are illustrated in Figure 4. As one can see the consideration of the 3 dimensions can lead to a new product.

Crawford and Di Benedetto (2010) are talking about needs and costumers, whereas in the LU method rather the solution to a problem is the goal. Nevertheless the dimensions can still be useful for the concepts of a radical product. There are several sequences of the dimensions possible. In case of a need of the costumer the business uses the appropriate technology after it identified the need and develops of the form with the support of the technology. There are also cases in which the business has already an innovative idea. Therefore a form might be needed which is valued by consumers when developed and this form needs the technology to be realized. The other possibility is that a company has a technology, identifies or estimates that there is a need in the market and tries to meet this need with the right form. In the case of this paper, which focuses on the concept within the LU method, not all orders of these dimension are profitable. As mentioned earlier the LU method aims at solving a problem, which is identified already at the start of the LU process. Within the process it makes use of or requires technology in order to create a successful and efficient form at the end. A good example of a failure created when considering the problem or benefit as the last step is the one of Apple's Newton application. Here Apple used its technology capacity to offer its customers the possibility to enter handwritten inputs. They later realized that there was not a real need or the right problem of the costumer and by this failed with its idea (Crawford and Di Benedetto, 2010).

The next paragraph covers aspects that are linked with the dimensions of Crawford and Di Benedetto (2010). First six guidelines are given that entail aspects covering the form, technology and need/ benefit. The following approach addresses rather the problem/ benefit since it is meant for the LU process. Afterwards specific examples for concept design are provided and final presentation methods for the concept. Furthermore linkages between the guidelines and the process steps of the LU method are given.

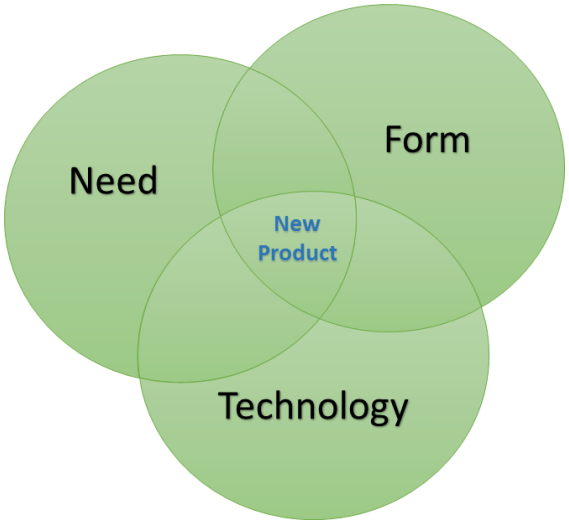

Figure 4: Three dimensions for a product concept (Crawford & Di Benedetto, 2010)

3.3 Concept generation guidelines (what is told?)

The implementation of the guidelines in a concept are not tested, still when followed in the suggested order, they could contribute to an efficient NPD when considered.

3.3.1 Problem formulation

Even though all players might already know the problem or need that has to be met by the innovation, since it will be communicated as from the step I of the LU method (von Hippel, 1991), the mentioning of the problem in the beginning of the concept again makes clear on what specific problem the team has focused on in the projects. Addressing the problem makes it easier, later on in the process, to evaluate whether the solutions created in the concept indeed meet the expectations of the firm and can create a better alignment with the actual goals of the firm. Furthermore by formulating the problem, the company can check whether the group really understood the issue to be solved. This guideline can support the dimension need/ benefit or in this case problem. As mentioned by Crawford and Di Benedetto (2010), focus of the problem or need in a product concept shows to be more beneficial. Cases like the one of Apple and its Newton Pad showed that a different approach might cause higher risk and failure.

3.3.2 Type of the product and the technology

In this stage a first description of the developed idea is given. The product idea will be announced and its final name, its features, functions and specifications. With product specification the size, form, geometry, manufacturing details are meant as well as additional description of characteristics, which underline the uniqueness of the product (Bharadwaj, 1998). The type of the product is relevant in order to be able to categorize the product and to align the rest of the guidelines to this. The reason is that there are more types of innovation. An innovation can be incremental or radical and in this case we are elaborating on radical product innovations. Incremental means improvements in a product ('doing what we already do better") and radical means a complete change ("doing what we never did before") (Norman & Verganti, 2012). The fact that the product is totally new to the market requires efficient and promising approaches, since the uncertainty and risks with radical innovations are higher. Good product criteria create better comparisons and higher competitiveness, since specifications can change the choice (Hsee et al., 2009). After the '*Aha Moment*' (Rock, 2011) and all the brainstorming and gathering of information people think about specifications to make their idea special and understandable for others in order to see the uniqueness in their idea; that what differentiates it from others. This guideline can be linked to the technology dimension. In this step the product specifications and design provide information and a look into the technology needed for its development. Here the team can use different design methods, which visualize the radical product idea and its characteristics. Example of such designs are provided later in this chapter.

3.3.3 Goal achievement by innovation and its uniqueness

After the description of the product an idea and first impression on the innovation can be reached but it might not be clear yet why exact this idea can help meeting the need and to solve the actual problem. This should be explained in this part. The target market is already known in Stage I and also elaborated in Stage III of the LU method (von Hippel, 1986). This means that the awareness of the target group exists. With this in mind the clarification of the solution created by the product idea can be set in this guideline. In this step the benefits provided by the product idea should be clear and the way the product solves the problems. Again the dimension need/benefits is addressed here.

3.3.4 Competitive positioning

Competitive positioning is about the differentiation between your innovative idea and others in the market (Borch & Roaldsen, 2007). A unique selling proposition of the product is important here to show the decision makers the relevance and marketability of it (Cookham, 2009). Since benefit is not the same as features (Levinson, 2007), which are provided in Guideline 1, the uniqueness of the solution and to what extend it differs with others need to be clear and outlined here. Examples can be benefits on the quality, and usage. In order to know the degree of competiveness, the team can make us of benchmarking. With the combination of the solution and the particular technology a higher competiveness can be achieved. Furthermore gathering the information regarding possible influences like he competition can lead to a better business case after the creation of the final concept. The preliminary business case is covered in Step II of the Lead User method, but the final elaboration on it happens after the conceptualization in the FEI (Churchill, von Hippel, & Sonnack, 2009).

3.3.5 Project schedule

In this time schedule the activities and times that might be needed for the development are displayed. With such a time schedule it is more transparent and easier to control the development of the product realization and to evaluate it. Furthermore the decision makers can get a first cost idea after they know how much time the development will take. According to Bhimani and Mulder (2001) between 70 % and 90 % of the total development costs can be figured out in this early stage. Furthermore the coordinator of the development team can use the information as a support for guidance and control of the processes.

3.3.6 Resource requirements

There is a reason why such a concept is made. For an innovative idea to be realized some funding and other resources are necessary. This stage is meant for all the input that is needed. Examples are the budget for the development, materials, people, skills that might need to be acquired because of some technical aspects and locations. Here it would be wise to remember the investors or management why their investment would be a good choice and why there is the chance of lower costs and risks with the development of the product.

3.4 Concept visualization / design (How is it told?)

Good concept design enables better understanding and acceptance, since it would be the first visualized form of the innovation idea. It provides better interaction between the product and user, information on product specification and by this a clarity for the target group and better awareness of possible complexities or difficulty of realizations. Nevertheless design methods differ on their complexity and usage. The firm should be aware that it might not have all the technical capabilities like mentioned in Guideline 2 'the type of the product'. The realization of a radical innovation might require new skills and sources (Volberda, 19990. That is why the project team and the firm need to be aware of its capabilities and the limitations and challenges that can be brought by specific design methods. Design methods can help to explore as well as test the ideas. One design method is the creation of pre-prototypes to provide a first visualization of the product concept. There are 2 types, which depend on the capabilities and resources of the business itself. These are called low-fidelity and high-fidelity prototypes (lo-fi; hi-fi). The fidelity states the level of details and functionability og a prototype (Pacheco, 2014).

3.4.1 Lo-Fi prototyping

Lo-Fi prototyping includes the use of a mixture of paper, cardboard, post-it notes, acetone sheets etc. (Egger, 2000). The results are testable and tangible and even staff that lacks specific technical skills can make use of this method. With the use of lo-fi methods the costs can be kept low as compared with hi-lo methods (Egger, 2000). Lo-fi prototypes are rough representations of concepts (Busche, 2014). This method helps to visualize the products specifications and functionality. According to Marc Rettig (1994) designers can spend 95% of their time to focus on the design itself, whereas spending only 5 % on technical issues. Lo-Fi prototypes can still vary a lot with the final product (Egger, 2000).

3.4.1.1 Hand sketching (2D design)

Hand sketching is an example for lo-fi prototyping and a method for designers, in which the technical drawings are drawn by hand. The sketches are then representations of designs, whereas the part itself can be seen as a part of design thinking (Ullman et al., 1990). Features, concepts as well as communication of ideas can be created quickly by sketching, which is another method for visual communication (Grenier, 2008). Compared to other design methods sketching is a rough drawing representing the chief features of any object (Merriam-Webster, 2008). Nevertheless hand drawings seem to be used far less than in the past with the development of Computer Aided Design software's (CADs for short). One example of an industry in which hand sketching seems to be a less used approach compared with digitalized design is the Mechanical Engineering expertise (Grenier, 2008). Hand sketching has its advantages and disadvantages when being considered for a design process. One of the main advantages is the flexibility of hand drawings. The fact that one is not distracted by any clicking or selecting it is possible to only focus on the thoughts and creativity in time and use the hands and eyes, which are then in a creative process. Furthermore the moment in which one is sketching by hand creates thoughts of building links and connections from one aspect to the other, which might be not the case when using a computer (Burtner, 20015). Moreover hand sketching can be done quickly within seconds (Grenier, 2008). Nevertheless The creation of light and shadow e.g. costs much time and might still cause bad results when drawn by hand. Any improves and changes can also cause a mess on the pages and this causes misunderstandings and confusion. Furthermore compared to digital sketching, drawings on paper cannot be easily saved and turned into digitalization or 3D printings.

3.4.1.2 *3D*

As compared to 2D paper prototypes, 3D prototypes offer benefits that cannot be met by 2D ones. 3D lo-fi prototyping enables a better interaction between the user and the product and better testing. It simulates more a real product. Materials that can be used for such a design method are e.g. plastic, wood and foams (Busche, 2014). An example for such a 3D prototype is a Mock-Up. Mock-ups are life-sized models (Kieser, 2014) and can be created in digital form or as a tangible output by using low-fidelity materials like cardboards (Soegaard & Dam, 2012). With the use of mockups the users can give better and easier feedbacks, since the model can show little details about the product (Kieser, 2014). By the mock-up not only the user but also the designers can observe how the product will look like and which technical and other features might be needed. Mock-ups also have the advantage that they do not require high costs and it can be changed by using the right tools like pens (Soegaard & Dam, 2012) or in the case of digital mock-ups standard image editing software's (Kieser, 2014). Whereas a final prototype has to function, a mock-up is based on static screen drawings e.g., that should look and feel as realistic as possible providing information on and visualization of functionality, conflicts and usage (Arafah, 2010). Nevertheless it is important that the design concept of the mock-up should not be that complicated, otherwise the user will lose the attention and it needs to provide only the most important details to ensure a better overview. Since the designer can chose between more complex software's and standard image editing software's like Photoshop there won't be difficulty for the designers in case they don't have the technical skills (Arafah, 2010).

3.4.2 Hi-fi prototyping

Hi-fi prototypes are even closer to the final product (Calvary et. al, 2007). Hi-fi prototyping requires rather programming skills since they are high-tech representations of the product. This also causes more costs (Egger, 2000). Examples of hi-fi prototyping can be specific applications software's like Computer aided designs short CAD. Application software's enable users to complete tasks such as crating documents, spreadsheets, databases and publications, doing online research, designing graphics and running businesses. Therefore they can be used as business tools as well. They help with graphics and multimedia projects and furthermore enable communication (Rainer & Turban, 2008).

3.4.2.1 CAD-data

A method for hi-fi prototyping are CAD data software's. With CAD companies can record their information of their products and all the data and display them as 2D or 3D models whether on screen or on paper. It is possible to look at the results from any vantage point and size and furthermore it is possible to produce evaluations and traditional plans (Autodesk, 2009). When a company decides to use a CAD software, it can view the innovation and drawings of it at different stages and fit to the imagination of the different targets like managers or end users. There are several benefits which can be created by CAD software's. One is that it can be combined with other software's (Siemens, 2015), which can help with creating more views, images or annotated drawings. These drawings resemble drawings made by hand and a higher level of precision is assured. With CAD one has the option of various views and interpretations of the product idea and the development or reconstructions of the product can be produced on demand no matter on paper or screens (CSA CAD Guide, n.d.). Furthermore most of CAD software's can provide 3D operations nowadays,

which creates a better visualization of the product in consideration. All in all with CAD it is possible to reduce uncertainty, misunderstanding and complexity (Eiteljorg, 2002). CAD software's are not only used by engineers but also by architects, drafters, artists and any other group whose goal is to make precise drawings and illustrations (CAD, 2011).

The fact that it is possible to combine it with several other CAD software's is the reason why nowadays more engineering companies make use of those multiple CAD systems. According to a survey made by the company Siemens (2015), the CAD software's are that popular that even small engineering companies use multi-CAD data for their product developments. Siemens surveyed about 150 designer and engineering managers at both small and medium sized manufacturing firms and of those the very small companies 31% used their information and data in more than 3 CAD formats and companies showing a turnover of about 100 million dollar do this about 61%. As one can see CAD software's are not unknown to the market but nevertheless this multi-usage also creates complexity. In the same survey 32% are experiencing difficulties with multi CAD data and lose the intelligence that was created by the original designers (Siemens, 2015). There is the option to use simpler CAD tools but this also means less powerful capabilities according to the Vice President of Product Management of PTC ("The Problems With CAD Tools", 2007).

2D CAD design

2D designs even when created on computers, are comparable with sketches made on paper. Nevertheless electronic versions are easier to share and change (Rudeck, 2012). In a 2D computer software cells of the object are digitally colored in order to be photographed in the traditional method and this is done with every single element of the object ("What is the difference between 3D and 2D animation?", 2010). Simple 2D-CAD systems are the primary form of the digital planning. The design lies on a 2-dimensional tier. Sketching elements of a 2D CAD-system are dots, lines, arcs and splines. Tools in a 2D CAD system enable the positioning, change and the removal of digital drawing elements. One disadvantage with 2D-CAD design is that in case the decision is made to prototype the concept idea, this is not possible with 2D-CAD design. This makes it difficult to explore design options (Rudeck, 2012).

3D CAD design

According to a survey conducted by the company PTC (Parametric Technology GmbH), 51% of the participants use 3D data for their design concepts and ideas and 61% claimed that they use 3D CAD modeling in order to achieve a variety of potential product designs (Schmitz, 2011). 3D design enables to create designs that are not possible in 2D or hand sketching. 3D CAD design involves 3-dimensional planning and work with real 3-dimensional volume models. With 3D CAD systems sketching can be left out and objects can be directly created in a virtual 3-dimensional scope (Lauffer, 2006). The goal of 3D CAD system is the illustration of the geometric data of the objects in 3 construction axis ("CAD", n.d.). An advantage of 3D objects is that one has the feeling of a physical product and how the product parts interact with each other (Autodesk, 2009). With a 3D CAD not only one product but a wide range of products can be created. Moreover when the designer changes any dimension, everything else related to that dimension changes too. This helps to avoid changing anything on the object without knowing what impact it has on other parts and by this causing failures. This was with 2D CAD the case (Haftl, 2007). Companies using 3D technology aim to entry the market quicker than before and according to Autodesk (2009), creator of 3D CAD software's, they show a higher profitability.

When compared with each other it seems that the usage of hi-fi prototypes needs some specific devices and skills. Furthermore more costs will be caused with hi-fi prototyping than lo-fi ones. A smart implementation would be to make use of lo-i prototype methods in case there is not much timer left of no big budget and in case the technical skills are not available.The methods mentioned in this chapter can help identifying the technology and general resources needed for the realization of the radical product and the solution to the problem. The fact the design especially with lo-fi prototyping can always be changed and adapted, creates more flexibility and space to get feedback and act upon it for finalizations. But the design methods are not the final step of the conceptualization. There is still the necessity to present and provide information on the outcomes and work to the decision makers. Ideas on how to do this more successfully is discussed in the next chapter.

3.5 How to present the concept with its chosen design method to decision makers?

Now that the guidelines of a concept and design methods for a product are provided, a good presentation and documentation of the whole concept is needed to win the confirmation by the decision makers and stakeholders. In the next section different forms in which a concept can be viewed and presented to the decision makers are discussed.

3.5.1 Concept note

Concept notes are necessary for any area of expertise. Whether for educational purposes, businesses or any other projects that need funding or approval for implementation and consideration. Also financing programs and funding agencies ask first for concept notes before they consider any cooperation, this is what I learned in my management studies. Concept notes in general are short summaries that tell the reader only the most important facts about the project in order to decide quickly on its realization. A concept note normally should not range more than 5 double-spaced pages (500 to 1250 words) (Spickard, 2005). Any firm can decide on how to structure its note and weigh the importance on the information given by it on its own. Nevertheless since I already provided the guidelines for a concept earlier in this paper, it would be smart to concentrate on the main aspects regarding each guideline in a concept note. After comparing several concept notes like the one of the Global Development Network (n.d.), the Malawi Innovation Challenge Fund (n.d.), the World Bank (2014) and the concept note of a Business Plan competition of the Merage School (2014), I found out that all of them indeed only provide summaries on aspects like a description of the problem or topic, the goal, the objectives, the planning and financial matters like required budgets.

3.5.2 Presentation methods

In the next paragraph I am going to address the following presentation methods, since those are the most used methods currently:

1. Presentation without visuals;
2. Presentation with slides;
3. Presentation with visualizer;
4. Combination of methods.

3.5.2.1 Presentation without visuals

In History people experienced speeches and presentations that proved how successful a person's presentation can be if several characteristics are met. One famous person who showed that it is possible to hold a presentation without any visuals is Steve Jobs during his presentation in 2005 at Stanford (Stanford Report, 2005). The reason for his success is mainly the story he was telling, that got all the attention from the audience. This makes the story in a presentation without any visuals the first important

requirement, otherwise the audience stops listening to the holder. Another way to keep the attention is the eye contact with the audience and the sound of the voice. Here Steve Jobs kept his voice comfortable while maintaining eye contact and in order to not lose their attention he made pauses during his speech ("A Successful Presentation", 2013).

They way Steve Jobs talked about his dramatic moments in life caused an increase in listening and interest in the public ("A Successful Presentation", 2013). This turning point might also be tool for any presentation concerning product developments for LUs. An example where the person presenting can use the turning point is when the problem is underlined or the products usability and its interaction with the user. Nevertheless it can be summed up that without the use of these methods during a presentation, the presentation might not have a successful presentation, since the audience would lose track quickly.

3.5.2.2 Presentation with slides

There are different presentation methods with slides. Examples are PowerPoint presentation, Keynote and Prezi. The benefits of the use of slides is that illustrations such as graphs and videos can be integrated not only words. This might give the audience better understanding of content and sometimes diversion from slide to slide. Nevertheless there are more negative aspects with which many are not aware of it. One is that the attention of the audience might less be concentrated on the presenter's content, while talking but more on the slides visualization (Atherton, 2011). Another pitfall is that the presenter even if it is not necessary, might constantly look at the slides, which leads the audience to look at them, too (Atherton, 2011). Both get distracted and might lose the content by this. The use of slides can also lead to time pressure, since the presenter might forget the time aspect when looking at the slides too often and in case of time pressure, the presenter has to hurry up, skip the slides and this can look unprofessional.

3.5.2.3 Presentation with visualizers

The fact that the presentation provides something visualized to the audience instead of only talking about the item, creates the brains imitation circuitry (Atherton, 2011) and visual images seem to be remembered later better than words or other abstract information (Paivio, 1986). This means that the use of visualizers enables the presenter to keep the attention and to retain the information given during the presentation in the audience's brain. An advantage compared with the presentation of slides is that the presenter would less likely look at his slides, which encourages the audience to do the same even if it is unnecessary. With a visualizer the presenter is less distracted and has only the option to look at the audience or the visualizer (Atherton, 2011). Furthermore a presentation with visualizers is flexible and spontaneous and enables higher interaction with the audience (Atherton, 2011).

In the case of a presentation of the concept it seems that the application of one of the computer aided design methods in the design phase of the product attracts the audience more since it would be the visualizer of the presentation.

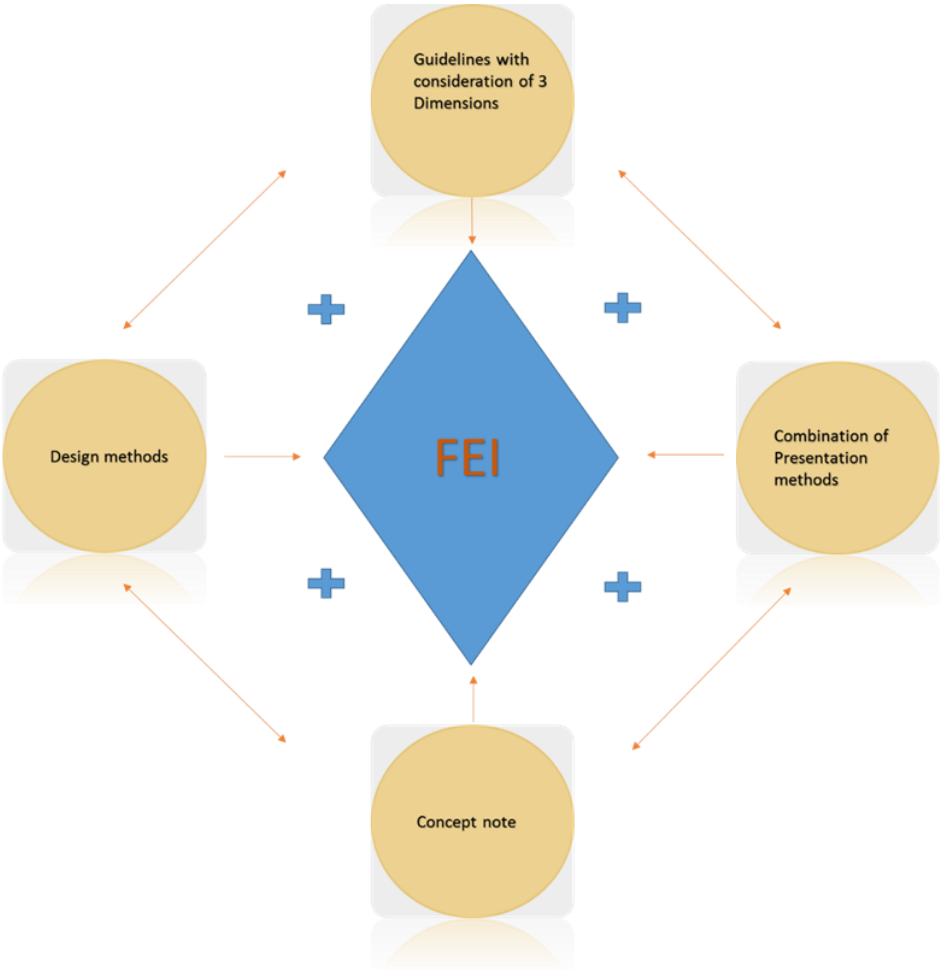

Figure 5: Dimensions of a successful FEI

3.5.2.4 Combination of methods

All 3 methods have their advantages and disadvantages as mentioned above but which presentation methods would fit better to the presentation of a concept relating to incremental innovation?

The best approach here would be a combination of all methods which is illustrated in Figure 5. Since there is a relatively high chance that the LUs chose one of the product design methods mentioned earlier, whether a low-fidelity type or a high one ,they will indeed have a visualizer. With the combination of a good story and behavior as a presenter and clear slides containing not too much information, a higher success can be achieved during the presentation. The switch between the visualizations and computer based media can provide the audience more interaction and entertainment. One way of linking the computer with a visualizer can be the use of a whiteboard, which displays the visualizer and is able to manipulate it by enabling drawings on the large, touch sensitive surface (Wolfvision.com, 2006). Still it is important to consider that the presentation would not get too complex for the audience. According to Atherton (2011) the switch between reading and listening can cause missing relevant information and poor learning.

As one can see on the next Figure 5, the collaboration of all methods described in this paper might lead to the approval to enter the next stage New Product Development in case the Front End of innovation follows the presented tools. The FEI is illustrated as a diamond to underline the idea of a successful and valuable FEI achieved by a right conceptualization process. This model illustrates the fusion of all guidelines including the idea of the 3 dimensions form, technology and benefit/ problem with the visualizations and presentation methods and shows their interaction with each other, which enables a higher chance for the development and realization of the incremental idea. Furthermore a summary of the guidelines, which can be given by a concept note gives an overview of the most relevant details of the concept. This can help with the consideration for the decision makers whether to invest more time and effort into the radical product idea or to stop directly. This concept note can cover notes on the 6 guidelines, type of product design and also provide key aspects for the presentations. The 6 guidelines can give a structure and base for the presentation methods to ensure a better overview and less complexity, whereas the presentation methods can strengthen the relevance of the guidelines, in case they are presented well to the audience. The presentation methods can even simplify and illustrate the guidelines with good and strong stories or/ and visualization to communicate the effect better. With the help of the product design methods like 2D or 3D CAD software's or maybe even hand sketching, the visualization of the product specifications, concept note and presentation elements can be achieved. The LU can chose between dfferent types of design methods like lo-fi and hi-fi protoypes according particulary for their radical product idea.

4. CONCLUSION

After all the information provided in this paper, it becomes clear that the term concept should not be seen as an easy process. The opposite is the case. No matter if a LU or any other engineer or designer. This paper underlined the fact why a concept plays a critical role for further idea development and includes many aspects. The findings showed that with the combination of guidelines, design and presentation methods the chance of confirmation by decision makers and investors might be higher. With the help of guidelines decision makers are able to get an idea on the marketability, complexity and importance of the innovation idea created by the project group of LUs and other firm employees and members, in the case of the LU method. This approach can be supported by the consideration of the 3 dimensions *form, technology and benefit* (Crawford & Benedetto, 2010). Only then the firm can ensure to include all important aspects regarding the conceptualization. The combination of the guidelines with the product design methods like types of prototypes and presentation methods might indeed support LUs with their concept development for the radical product idea. This can be obtained from all the benefits they create and examples of organization using them. A successful story telling with the support of visualizations whether based on high fidelity or low fidelity techniques sustains the attention and causes interest and high possibility of confirmation by the particular audience. It also became clear that during the conceptualization it is not enough only to come to a solution but to a specific solution. It is relevant to seek a right understanding of the solution and problems, especially in the LU method, since here the solution to the problem is the goal. What needs to be in the mind of the innovators is that the product conceptualization begins with understanding the product and its goal and idea behind it. Especially in a high competitive environment with all the technology accessible and the quick change in peoples life style and needs in this generation, it is important to make such a conceptualization as quickly and efficient as possible. With other words, a concept covers the specifics of the idea and its vision and this can be done in a way provided in this paper.

5. DISCUSSION AND FURTHER RESEARCH

Conducting this research showed how unelaborated the term 'concept' is and that really no real research is done on product concepts at all yet, especially not scientifically. This is surprisingly to me since I learned the importance of a good concept for product development and general business aspects. It was hard to find tools and steps for the concept creation. The solution of this paper, which is the combination of concept guidelines, product design and presentation methods, is not tested. This research is limited by the lack of practical research and findings. Ideas for further research could be to clearly focus on product concepts in general so that a better approach could be possible for implementation. The findings are mostly based on information given on blogs and websites, still they might contribute to a qualitative solution, which I hope to have achieved in this paper. LUs and in general organizations, who are at the point in which they need to create the final concept can take the methods and findings of this paper in consideration, since they show many advantages for the current competitive market. Another investigation can be made towards the role of business cases and its link to the FEI, since according to von Hippel the final business case is made after the conceptualization phase but not much information is provided about this relation

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