VISUALIZING EARLY PRODUCT DECISIONS AND STICKING TO THEM… OR NOT

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ABSTRACT

An important skill in the professional life of an industrial design is to be able to create products and thereby making product / development decisions within a given set of limitations. These parameters are important factors, which should be used actively, when venturing into design / development of a new product, from idea to finished product.

This paper presents the challenges from a course at the Industrial Design programme at Aalborg University, with creating, grasping and concretizing the very non-concrete parameters that often appear when initiation a design process [1]. At the same time this paper presents a design thinking [2] approach to some of the possibilities for utilizing this non-concrete information in design specifications, thereby leading to a different design process, building on the principles of Ries [3], facilitating a series of informed, divergent and convergent, thought processes. This paper seeks to describe some of the possibilities in using this process as well as some of the shortcomings.

At the same time the paper presents a way of creating a common foundation for addressing / discussing the non-concrete parameters at the beginning of the design process, named the value based mood board tool, which allows the students to reflect upon the difficulties of making decisions and sticking to the consequences. The approach will in this paper be reflected upon from both a student point-of-view and as well as a professional, practicing designers point-of-view.

Keywords: Design thinking, design process, product decisions, product design, design guidelines, visual approach

1   INTRODUCTION

A common phrase could be: Designers deal with uncertainty, engineers deal with certainty. The linear design process depicted and explained by Eppinger & Ullich [1], figure 1, are widely used as the overall tool for guiding and controlling the design and development process. However as the process model facilitates and ensures overall progress within the design and development activities, the model does not encompass all activities that are undertaken as a designer, where often "fuzzy" decisions are taken on a loose foundation. Design students therefore often get stuck in creating great design through several iterations, see figure 2, or ensuring progress, see figure 1, and thereby just creating another product.

This paper is about getting the job done and still being able to design well thought-out products in
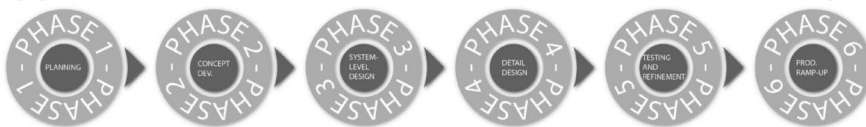

Figure 1. Eppinger & Ullrich´ overall development process, planning, concept development, system-level design, detail design, testing and refinement, production ramp-up, [1], with a strong foundation in the stage-to-gate process [8]

time. This paper is about making informed decisions and thereby, through several iterations, facilitating a forward going divergent / convergent design process.

Decision making within the design process is, by nature, non-concrete and difficult to grasp. The open-ended problem solving ensures that there not necessarily are any wrong decisions, but a necessity to be able to explain the reason behind the decisions arises. As described by Haque et al. [2],

the process of making decisions can be divided into several steps; Objectives, alternatives, criteria, selected solution and consequence. As this paper is taking starting point in an iterative process, see figure 2, the decision process should be used several times within the duration of the project, in order for the students to experience the consequences of their decisions.
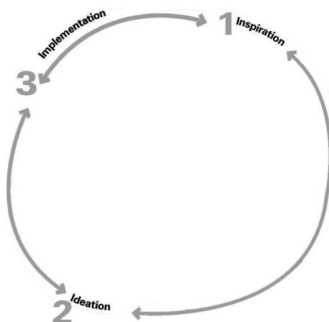

Figure 2. Design thinking development cycle, Tim Brown

As design is a visual craft, the visualization of decisions and knowledge are an obvious way of creating a visual understanding of the decisions made. MacInnis and Price [3], describes how knowledge can be transformed into decisions guidelines, through the use of imagery.

This would enable the knowledge to be used to frame problems, and as a basis for further problem solving, provided that it is combined by a use scenario [3]. This scenario can be perceived as an overlay upon images inherent ability to be open to interpretation. This combination of a divergent (images) and a convergent (scenario) thought process enables the designer to complete the process of making decisions [2], going from creating objectives, defining them, selecting solutions, witnessing the consequences and repeating the process as described by Haque et al. [2] and Tim Brown [4].

This sets the decision making process [2] alongside the design thinking development cycle [4], see figure 2, where the process are defined by; inspiration, ideation and implementation, as a free floating forward and backward going process that should be iterated upon several times, as needed. The decision making process described by Haque et al. [2] are in this course module set in the *inspiration* part of the design thinking development process, figure 2 [4], and thereby defines a foundation for the ensuing process. Decisions can, and should, be taken in other parts of the design process as well, but this course module focuses on the initial decision making.

1.1 Existing methods

A commonly used visualization tool for the industrial designer and industrial design student is the mood board [7], where visual metaphors are used to set a certain *mood* that should make a foundation for the design process. However, this foundation is very open to interpretation, because of the non-concrete nature of visual metaphors [3]. In order to enable decision making in the beginning of the design process, the foundation for these decision needs to be present. It is therefore necessary to do more with the visual metaphors than just letting them be open to interpretation. The combination of concrete, written scenarios [3] and non-concrete visual metaphors enables the possibility to describe feeling as well as visual and functional design guidelines, which can be used directly as foundation for early design process decisions.

2 RESEARCH SETUP AND METHOD

2.1 The course construction

The course module that this paper are built upon, have taken place as a part of the industrial design programme at Aalborg University, as a 5 ECTS course module. The course consisted of 22 2nd semester master students. The students have been working individually in the course module, but helping each other with inspiration, questions etc. The 5 ECTS works load corresponds to 150 hours of student work, which is also reflected in the results the students have achieved. Along the course of the

module there have been several guidance sessions where the students have been offered help with their assignment. There have been given lectures on specific topics; trend spotting and material and production knowledge, supporting the overall structure of the course, as well as the more specific tasks laid out for the students.

The students were in the course progress given an assignment of designing a product for the kitchen, e.g. blender, cooking knifes, utensils, storage solutions etc. and within the design process make early decisions about their product, based upon their own choice as well as research. The necessity of visualizing their decisions, both in visual metaphors and written scenario [3] was stressed to the students; the students needed to make a presentation where it was possible to follow their line of thoughts and choices, to the final product. The course was among other things evaluated on the student's decision making process and the transparency of this in the final product. See table 1 for overall course and lecture setup.

Table 1. The four decision components and the questions asked for each of the components, together the four parts should be used to create a product design

	Company	Brand values	Trend spotting	Material
Selection method	Choice	Choice / visualized	Research / visualized	Research
Information given to students	Student research	Student research	Lecture	Lecture
Question asked	To whom should I design?	What does my selected company look like, and what kind of products do they make, and why?	What trend do I think could be used in the development of this new product, and what could I use that for?	What plastic material should I use in my design, what specifications should I focus on and what sub-selections does this add to the design?
Deliverable from students	Design specifications + Value based mood board	Value based mood board	Value based mood board	Specifications

Each of the three decisions components described above in table 1, can be seen as three separate foci for the design project. The three components describe some of the parameters that should or could be taken into consideration when designing a product, as in this example. Each of the three foci; brand, trend and material is a convergent thought process, but the process of answering the asked question before the answer is a divergent process, thus does the students go through several divergent / convergent though processes in order to create their product design.

2.2 Building upon each other

The overall process of selecting and working with the individual project components; company, brand, trend and material, were meant as a match to the overall rhythm of the design process. As seen in figure 1, a general convergent process (over the entire duration of the design process) are present. Each of the four project components can be described as a decision parameter, which again encompasses a divergent and a convergent process, (when you make a decision you also deselect some options).

2.3 The design process in another light

When going from a traditional development cycle [1], see figure 1, to a more "design thinking" based approach [4], see figure 2, the focus of the process shifts from only achieving progress and fulfilling milestones, to accelerating the process in order to doing multiple development cycles. As the design thinking approach also are played out over time, the process is also continues but the research phase includes a greater amount of uncertainty that have to be worked through in order to get to the clarity / focus part of the process, see figure 3.The first part of the squiggle of design, figure 3, can be translated into several cycles of development, as described by Tim Brown [11], consisting of divergent and convergent processes, that are worked through in order to develop / refine a design or product.
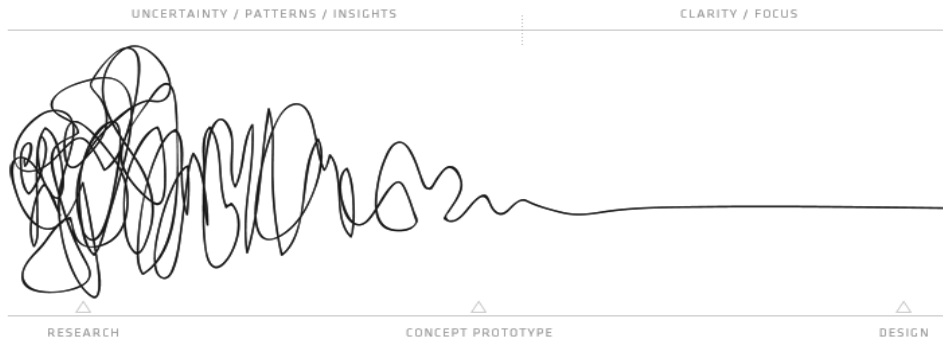
UNCERTAINTY / PATTERNS / INSIGHTS   CLARITY / FOCUS

RESEARCH   CONCEPT PROTOTYPE   DESIGN

Figure 3. Squiggle of design, Damien Newman, Central Office of Design [11]

3   THE VALUE BASED MOOD BOARD TOOL

The tool that have been used to enable the shift from non-concrete to concrete, from development mode to design thinking, as shown in figure 5 and 6, have been dubbed *the value based mood board tool*. The tool is a combination of the mood board, described as a way of communicating moods, feelings, overall design direction etc. by Gerhard Heufler [9], and the written specification used in the design brief [10] [3].

The problem with the mood board is that it is based on semantic, cultural, social and emotional factors [9] And therefore the mood board is only considered as a inward going process, that visualize a convergent thought process for the designer itself. In creating a mood board there is necessarily not a divergent research phase present. Thus a mood board can be created upon the hunches of the designer, whereas the divergent thought process are categorized by an active thought research phase about a specific subject.
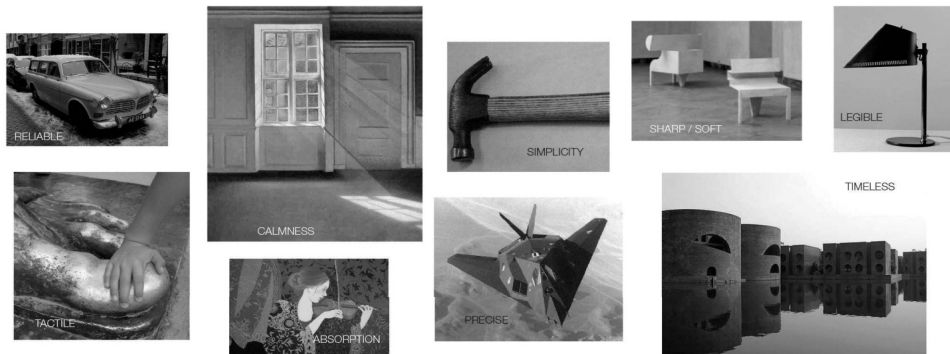

Figure 4. Student example on a value based mood board, this example lacks the direct link to concrete written scenario and therefore takes on the characteristics of a regular mood board

Anybody that is outside the thought processes of the designer, e.g. customers, assistants, suppliers etc. cannot decipher the intent and content of the mood board, because of the foundation in the context of an individual person. As seen on figure 8, the lower left image, with the title; tactile, contains no real information, because anybody can read into the image and written scenario a wide range of information. For example it could mean the use of brass material, or a smooth surface, or the experience of something used in the design or an ergonomic grip etc. The mood board in figure 8 entirely builds upon semantic, cultural, social and emotional factors, as described by Heufler [9].

The idea of the value based mood board tool is to use the mood board as a outward going tool, that can be used and understood by customers, assistants, suppliers etc. as well as a tool for defining and

specifying design elements and directions, inwards. This should be done with basis in visual metaphors and written scenarios. In order create a common understanding between designer and customer the information that is embedded within the mood board needs to be transferred into tangible knowledge [3].

Figure 5. Student example on a value based mood board, where the written scenario has been described, giving the reader tangible information that can be used afterwards

The design brief [10] are commonly known and understood as an agreement between the different parties in the project, which sets different specifications, such as material, dimension, target cost, surface finish, deadlines etc. on paper. The information in the design brief is often concrete, measurable information that can be verified as completed or not-completed.

The open-ended conclusions of the mood board and the finite information of the design brief enable the designer and others to combine the two in order to create a divergent / convergent process loop, where information is researched through the visual metaphors and this inherent information is made concrete through finite specification, known from the design brief.

An example of a value based mood board can be seen in figure 9, which utilizes both divergent visual metaphors and convergent written statements. E.g. the fruit / vegetable box, an image that can be interpreted in many ways, leading to both design guidelines, colour schemes, product concepts etc. The written statements on the pictures, selects the parts of the images that are to be utilized and elaborates on the arrangement on the fruits, stating that the arrangement in the final product should be "random but orderly". In this way a series of product decisions are visualized and made tangible in an inward and outward going manner, so all parties of the project can follow the product decisions and experience the impact on the final product.

The input research for the value based mood board tool can come from a wide variety of sources, e.g. user research, workshops, market mapping etc. the variety and magnitude of the input will vary, depending on the product type. The output and thereby value of the value based mood board tool will depend on the input. The more input that are deposited into the tool, the more decisions can be made before the ideation process begins.

4   DISCUSSION

The course module resulted in 20 handed in projects that all managed to present a final product design that reflected the three product decisions the students had to take along the course. In general the handed in projects were of a high standard, as a reflection of the lectures, not all students had used the value based mood board to a full extend.

Earlier in the design education curriculum the students had established knowledge to the mood board tool, the knowledge of this tool have seemed to persist throughout most of the assignments, thereby the students have not used the value based mood board as a finite, divergent *and* convergent tool in the decision making of the design process. Most students have made written statements upon the pictures of the mood board, but the statements are of a very non-concrete nature, e.g. figure 8, "feels light in room", which is stating the obvious, and can lead to many different design solutions, depending on

how this statement and visual metaphor are interpreted. A more tangible expression could have been made, an expression that the students were able to measure, e.g. "must not be more than one third of the total room height and must not have any surfaces over 10 mm in thickness."

Another tendency was to choose a very iconic and well known company / brand and then make a product for the company, without using the value based design brief, as seen in figure 11. The fact that the chosen company was so well known enabled some of the students in creating a product that fitted very well into an existing design style, without making their decisions tangible, and without defining any decisions / guidelines that should be abided by throughout the design process.

Figure 6. Student work, kitchen knife for Porsche, example of a famous brand that are easy to create products for

The results of the handed in assignments were mainly focused on the lower quality of coherence between the initial specification and the designed result. There can be many different reasons for this, but one is that the students had too little time to actually do several iterations upon the divergent and convergent design process.

Can the Value Based Mood Board Tool help design students make informed product decisions early in the design process? Even though this paper only have presented a short suggestion to a tool that possible can help with making some of the decisions in the design process tangible, the need for information / grounds for informed decision making exists in order to enable the overall process of a design thinking based approach. The Value Based Mood Board tool are not without flaws, there are as shown several pitfalls included in the tool, such as choosing a brand that are too publically known or famous or not having enough time to do several iterations. As the tool does use the already known method of divergent / convergent [11] thinking to strengthen the design process decision making.

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