PROJECT WAR ROOM

Developing A Tool To Align Internal Departments On Product Strategy

Graduation project
Report
Strategic Product Design
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PREFACE

In 2012 I started my studies at the Delft University of Technology. Now, six years later, they have come to an end. When I started, I was driven by exploring how technologies could be developed in a creative way. Over the years my I become more and more interested not in the design of consumer products, but in products that help designers and other stakeholders to provide their customers with desired solutions.

The companies which are most successful and create the most innovative products are also the companies that put in the most effort into innovating their practices as well! Wanting to be a part of this, I started focussing on how design can contribute to the practices of product development teams in order to produce the innovations of tomorrow.

This line of thought kept me busy and resulted in me taking on the design challenge proposed in this thesis. This thesis is about how the innovation teams cooperate by creating a shared understanding of the strategic direction.

Reading guide
For readers who are interested in the concepts behind alignment, chapter 2 provides a case study, supported by literature, that proposes a tangible way to create alignment.

For readers interested in how systems models and product strategy are intertwined, chapter 3 should be consulted.

For readers who are interested in the final concept, chapter 7 presents an overview of the proposal. If you want to know more about the process in which the final concept came into being, chapters 4, 5, and 6 can be read.

Acknowledgements
I have not been on my own during this graduation journey. Therefore I want to acknowledge the people who helped me in getting me to where I am now. I would like to thank my coaching team, Sylvia, Steffen, Hidde, and Merijn, for all their sharp feedback, guidance, and motivation. I would also like to thank my fellow students, Carlijn, Emil, Albert, Omar, Sergej, Marloes, Joost, Wouter, Rebekka, and everyone else I'm forgetting. Without your time and inspiration I would never have managed to present to you the work in front of you. Thanks for all the coffee breaks and beers! A special thanks to Joost, I'm sorry I almost never made it as far as Woerden. I would also like to thank my family for supporting me throughout my studies. Enjoy.

October 19th, 2018

City of Delft

Tobias Hebbink

EXECUTIVE SUMMARY

This project has explored concepts of alignment and product strategy to meet Ultimaker's needs. Insights were gathered from multiple sources to analyse the project's brief and explore its facets. The company's intention is to create a space in which alignment on product strategy will take place.

Through interviewing employees, a number of problems were identified that could form the focus of this process. The three main frustrations around alignment were: the abstraction of product strategy information, the complexity of product strategy systems, and the top-down communication of product strategy.

Although alignment is a very broad and abstract subject, an image of what it entails could be defined. Alignment is considered to exist out of two aspects: knowledge of interrelations and a shared goal. Between people there needs to be consensus on these two aspects to effectively work as a group. To become aware of the interrelations and the shared goal, communication needs to be organised in a structured way. It was found that many forms and places of communication exist within the company. Literature showed that, although verbal and visual communication are most used in daily routines, physical communication offers collaborative means as well.

Another part of this project's explorations was that of product strategy. Most companies have their own way of developing and managing product strategy, though those practices are still being explored and instituted at Ultimaker. To establish a structured product strategy a company has to create a clear overview of the systems model. A systems model is the congruence of components and their connections (Wujec, 2015). Ultimaker is currently feeding product strategy components through the product management department to the project teams with tools such as personas, applications, user values, etcetera. Information is gathered internally and externally to setup new projects and continue to feed information to projects under development. In between the product management department and project teams is where the alignment processes are most stressed because of differences in priorities between the groups.

Merging the two concepts of alignment and product strategy resulted in several ideas to create an organised method. The outcome of the ideation phase proposed a physical systems modeling tool to create overviews of projects which can be stored in a War room. The tool enables product management and project leads to define project compositions. Besides, the project compositions can be used as a reference to the projects' essence throughout the product lifecycle.

The tool aims to increase project awareness, structure discussions, and allow for collaborations on project compositions. Employees are to use a pre-developed, magnetic whiteboard, template and building blocks to create an overview of a project. This can be attached to the wall in the War room where it can be reviewed by interested stakeholders.

1. INTRODUCTION

1.1. The project

Ultimaker is a fast growing company which urges them to draw more attention to the way internal communicating changes. Big companies need to spend a lot attention to the way they communicate internally. Since more people are involved in projects and because more projects are being initialized, the understanding between stakeholders becomes more difficult to manage. Besides, Ultimaker is engaging in a lot of partnerships, affecting communication effectiveness.

Communication plays a big part in many organisations and can make or break a company. Ultimaker, noticing the value of proper communication, issued Project War Woom to take off in pursuit of creating coordinated communication of their product strategy.

This report in front of you concerns the graduation project of Tobias Hebbink commisioned by Ultimaker. In this report you'll find the results of a design process pursuing the creation of alignment on product strategy between departments at Ultimaker.

1.2. Ultimaker

Short history of Ultimaker

The client, Ultimaker, is a product development company which offers 3D printing systems. These systems include product ranges of hardware and software products, services, and materials.

Ultimaker is a Dutch 3D printer company that was founded in 2011. Starting by selling unassembled kits of the Ultimaker Original, Ultimaker began tapping into the potential of 3D printing. Over the years, Ultimaker launched several 3D printers and accompanying materials enabling companies to increase efficiency in product development processes.

The success of Ultimaker led to a growth spurt still taking place. In seven years of operation, Ultimaker expanded from three employees to almost three hundred divided over three continents. This development impacted the way they operate greatly, because the company needed to shift quickly from a start-up culture to that of a large enterprise.

Ultimaker products

Hardware products Ultimaker produces are 3D printers, specifically FDM (fused deposition modeling) printers made for office workspaces. They fit on desks and offer design agencies and engineering companies the possibility to rapidly make visual models. Other uses include the production of end parts, jigs and fixtures.

Figure 1-1. Ultimaker printers

Software products are focused on the slicing software Cura. Cura is a prominent software product with which people can slice STL (stereolithography) files, formatting the file in such a way that a printer can be instructed to produce the model. Other software products Ultimaker offers are Cura Connect and an Ultimaker mobile application.

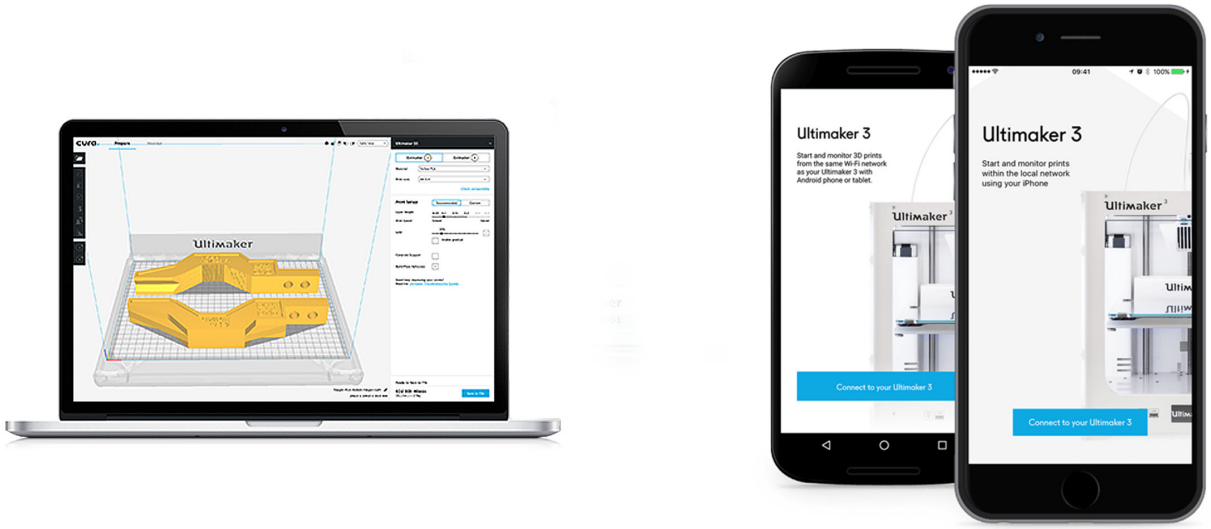


Figure 1-2. Ultimaker software

Ultimaker's big vision

The company's identity can be described through the 'golden circle' introduced by Simon Sinek (Sinek, 2009). In his model he makes a distinction between three aspects. The first is the 'why'. The why is an abstract level explanation of a company's existence. The second part is the 'how'. Through the 'how' a company can explain their plan that ensures the 'why' is met. Finally, the third part explains what the company offers by describing, in less abstract terms, 'what' it does.

Ultimaker has such a vision; Ultimaker's ultimate vision is to accelerate the world's transition to local digital manufacturing.

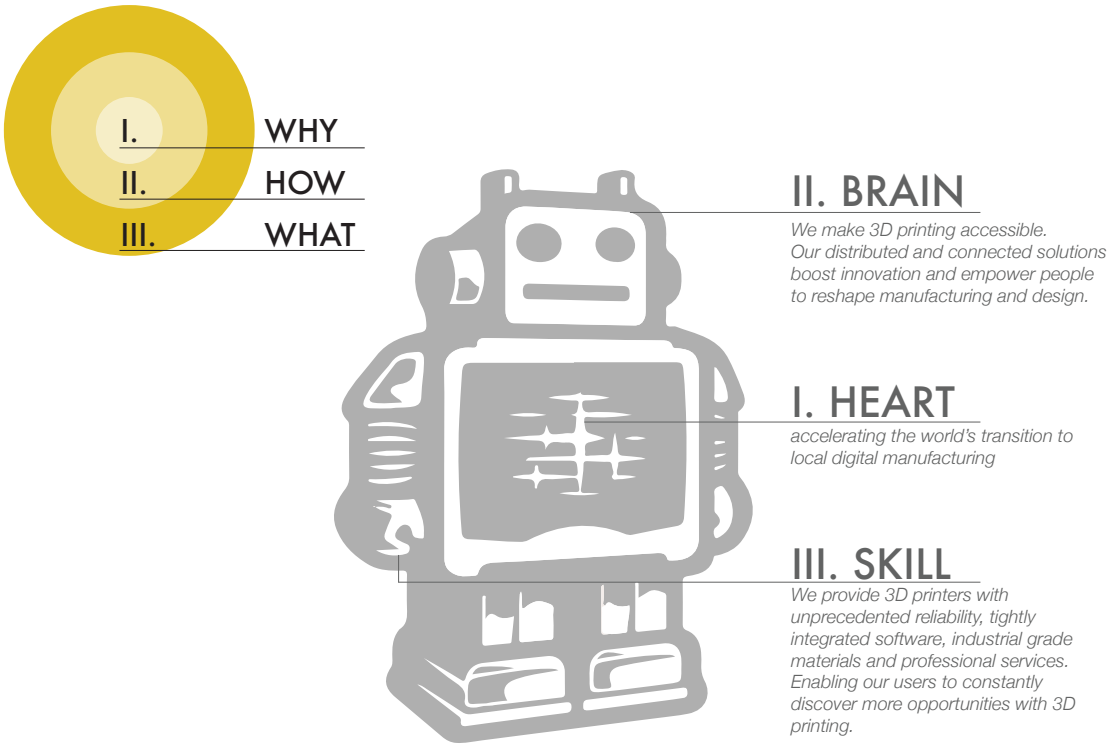


Figure 1-3. Ultimaker vision (Sinek, 2009)

1.3. Given problem

Needing to attend to internal communication processes, the company has initiated this project. Their initial assignment is explained here to set the stage. In appendix A the company assignment is presented as well.

"How to effectively use a space to align internal departments on innovation and product strategy?"

Unraveling the assignment requires the exploration of knowledge surrounding alignment and product strategy. The assignment mentions a physical space as well. But focusing on the room would limit the scope of the alignment practices in the ideation phase. Therefore the focus is diverted from the room to the alignment and product strategy topics.

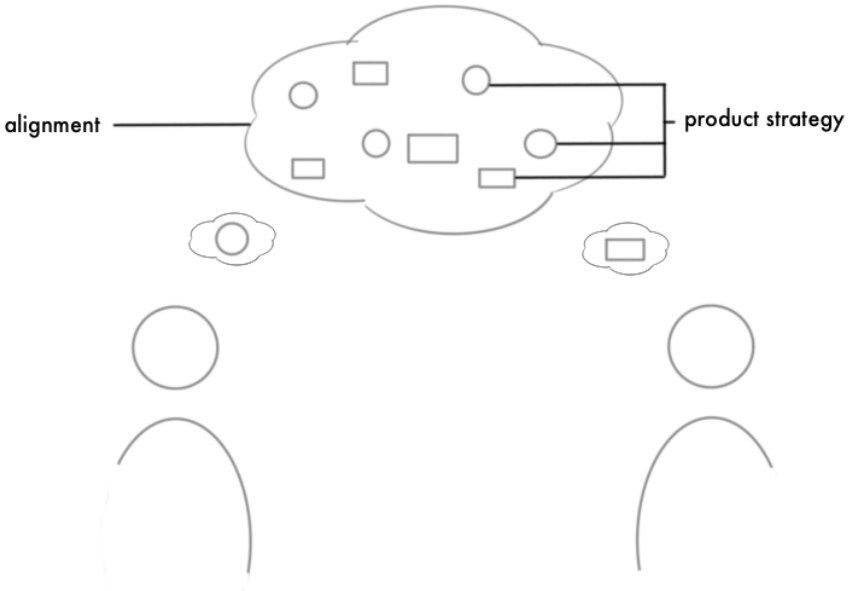


Figure 1-4. Two components: alignment and product strategy

1.4. Approach of the project

In light of achieving the goal, the report is structured after the Double Diamond (British Design Council, n.d.; Nessler, 2016) model which influenced the process as well. Through this structuring you'll be guided through two consecutive sequences in which diverging and converging practices are explained.

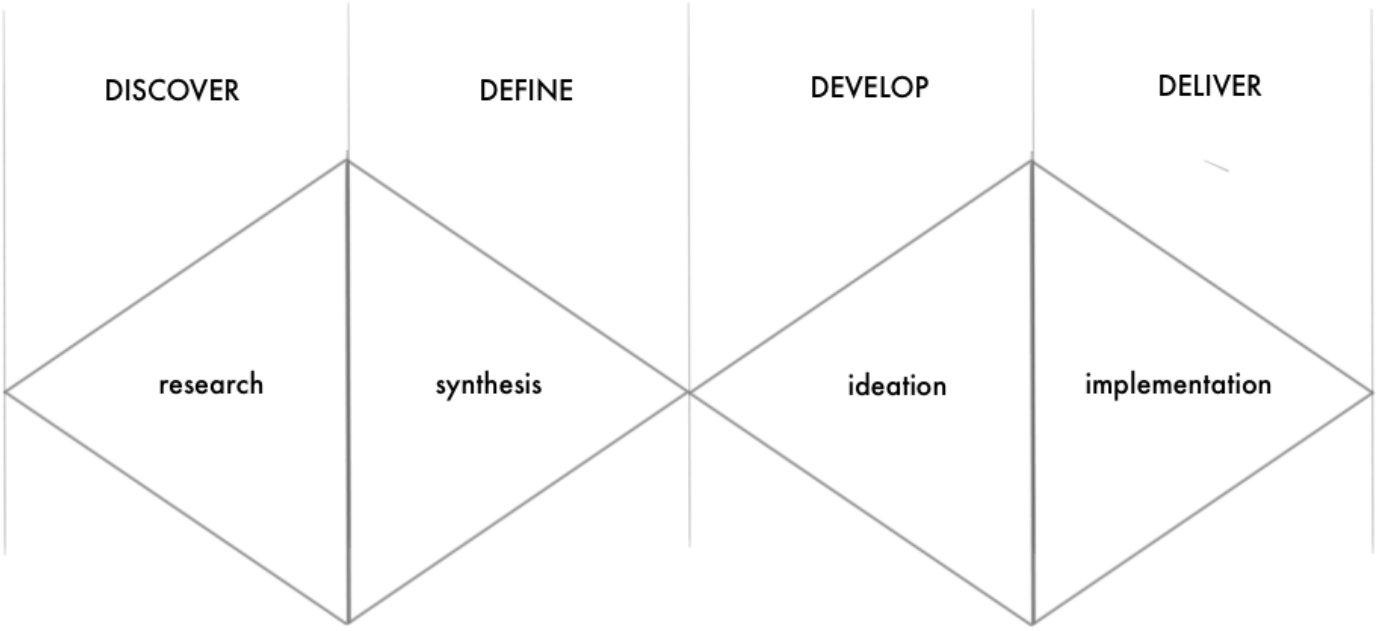


Figure 1-5. Double Diamond Model (British Design Council, 2005)

In the first phase, 'discover', the analysis of the project is highlighted, covering the internal and external research. The second phase, 'define', summarises and transforms the data into useful guidelines to enter the third phase. The third phase, 'develop', is characterised by the development of concepts and their validation. Finally, the report closes with the presentation of the final concept and its implementation plan in the 'deliver' phase, followed by the conclusion and recommendations.

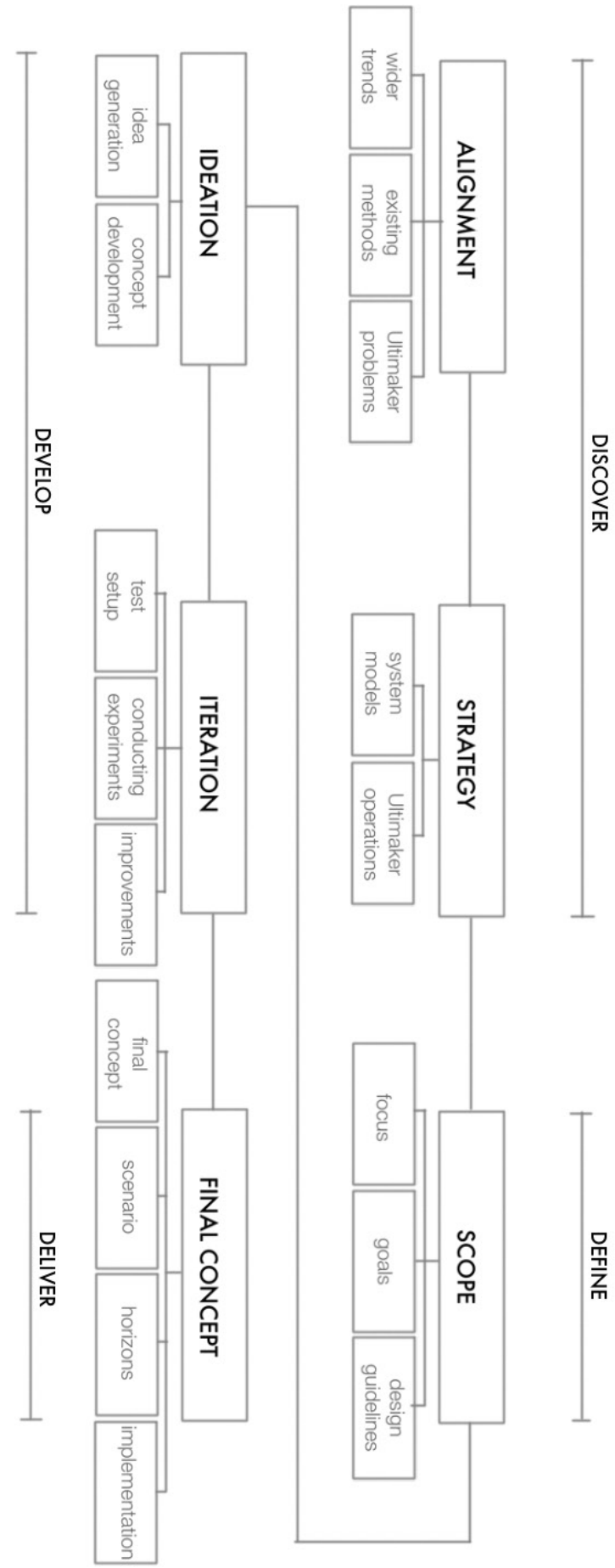


Figure 1-6. Report layout

DISCOVER

The discover phase highlights the explorative phase of the project. Through diverging practices information is gathered that will lead up to the define phase. In the next chapters alignment and product strategy topics are explored through an outside-in approach. First a general view is presented followed by a description of how that plays a role at Ultimaker.

2. A CONCEPT OF ALIGNMENT

2.1. Introduction

The desire to create alignment is not an isolated topic, therefore it is not possible to create a generic tool. That is why a common understanding of the term alignment is needed before it is possible to identify how alignment should be managed at Ultimaker. Therefore in depth knowledge of the needs at Ultimaker have been explored through internal research. Existing practices have been analysed and explored that led to the discovery of challenges applicable to Ultimaker.

2.2. Defining alignment

When talking about alignment it is necessary to specify what alignment is. Alignment on product strategy in businesses concerns two components (Stompff, 2012): a mutual understanding of the 1) shared goal and 2) interrelations (see figure 2-1).

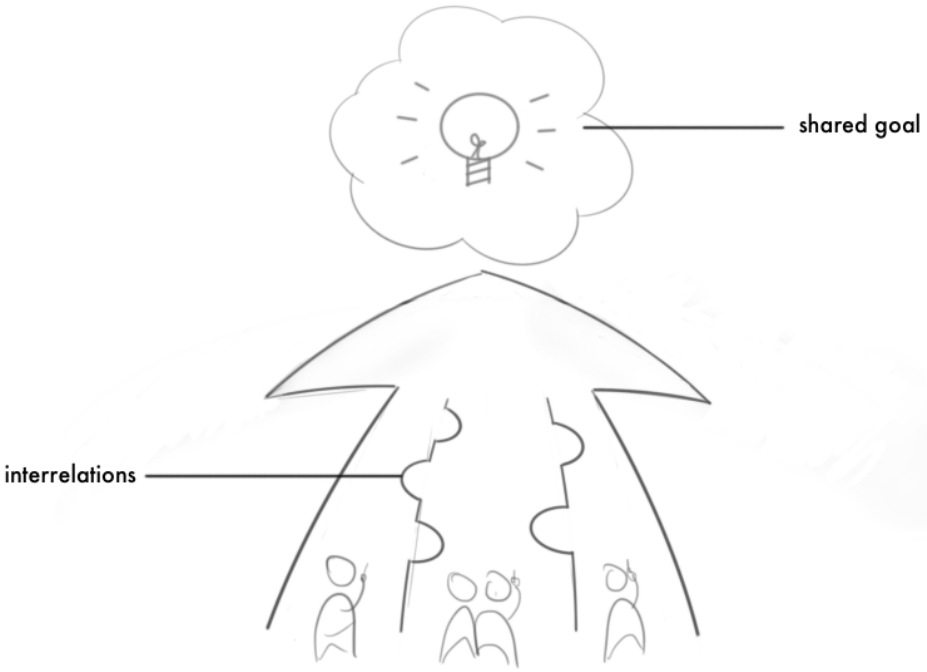


Figure 2-1. Shared goal and interrelations

Think of alignment as a group of people trying to solve a puzzle. The connections between the pieces are called the interrelations. To know how the pieces fit together, the participants need to have an idea of the big picture.

"THINK OF ALIGNMENT AS A GROUP OF PEOPLE TRYING TO SOLVE A PUZZLE"

In his thesis, Stompff investigated what factors consitute team cognition. Team cognition being the collective thinking of a team. His work, resulting in a new framework, describes the difference between the individual and team level of the collective mind (Weick & Roberts, 1993). The collective mind works both explicitly as well as implicitly (Espinosa et al., 2004). Through interpreting what the effect of the team members actions are, the members learn how their individual actions influence that of others. Over time, the team members will act with heed for the others' aims (Stompff, 2012).

Interrelating the team's activities can be done through means of communication, procedures, and standards. It is through the flux of events that awareness of the connections is created. In regard to the activities, Perri (2014) remarks that it is not the building that is difficult. It is the figuring out what to do and how to do so which is hard, especially when working in multidisciplinairy teams.

2.3. Trends affecting alignment

Ultimaker is not the only company struggling with the tuning of internal processes. Because today's business environments demand companies to adapt, they are trying to optimize their practices. Trends such as strategic partnerships, product complexity, and interconnectedness require companies to focus on the way they create alignment.

Increase in partnerships

The impact of strategic partnerships is increasing. In today's business landscape partnerships are critical drivers of innovation, growth, and social impact (Auerbach, 2018). Especially with the arrival of the digital age it becomes much easier for companies to collaborate (Riccio, 2015). However, according to Kicker (2017) it is still a top priority to manage communication channels to keep priorities and values between partners clear.

More complex products

According to Porter (1996) and Ulonska (2014), NPD companies need to find a unique set of activities to stay ahead of competition. That requires the creation of innovative, new products providing high value to the customers. As a result, products and their development become more complex (Hitt et al., 2011). The increase in product complexity makes knowledge a valuable asset. Alignment is therefore sought after to obtain and share valuable knowledge.

Increasing interconnectedness

Another trend that influences the way we look at alignment is the importance of interconnectedness (Deloitte, 2018). According to Facing the Future (n.d.), "Interconnectedness refers the manner in which a group of objects interact with one another to form a complex whole that operates as a system." Through system thinking interdependencies can be uncovered. Therefore increasing interconnectedness requires more controlled and structured systems.

"THE PRACTICES ARE DIVIDED INTO ENCOUNTERS BETWEEN EMPLOYEES AND THE TOOLS THEY USE DURING THOSE ENCOUNTERS"

Concluding
Because the business landscape is ever-changing, the desire for alignment will always be present. Nowadays it is important for companies to focus on their priorities and values when working in partnerships. Besides, alignment is needed to secure valuable knowledge in complex environments. Finally, structure and control regarding systems is needed to uncover interdependies.

2.4. Alignment in practice

The way alignment is currently been practiced at Ultimaker is described. Doing so explores the context of the situation to which the outcome of this report has to adapt to. The practices are divided into encounters between employees and the tools they use during those encounters. Besides the inventory of alignment methods, a tangible communication approach is proposed.

Encounters at Ultimaker
Experts mentioned a range of events that are deployed by companies to generate alignment. From exhitbitions to meetings, each company has its own way of aligning its people. The logic behind this is that as people differ, so are the ways in which they work.

Environments in which alignment is considered to be taking place in Ultimaker is where people come together. On a daily basis those environments are the walkways, meeting rooms, and people's desks. In this regard, a distinction is to be made between formal and informal encounters. Formal encounters being planned timeframes in which communication happens as opposed to informal encounters in which people run into each other by happenstance. The different encounters have been collected in table 2-1.

encounter	topics	frequency	formal/informal
cantine	personal life, opinions	low	informal
walkway	quick questions, low risk decisions	high	informal
coffee corner	low risk decisions, elaborate explanations	low	informal
desk	elaborate explanations, collaborative work, stand-ups	medium	informal/informal
meeting room	progress updates, presentations, workshops, consult, high risk decisions, partner meetings	high	formal
conference hall	company wide presentations, demos	low	formal
internal exhibition	company wide presentations	low	formal

Table 2-1. Encounters

Tools used at Ultimaker
Tools are a common means to keep information up to date and to structurally communicate. These tools are often used to support the encounters. They provide structured information (eg. posters, presentations, etc.) that improve the credibility of one's story. Other uses of tools can be digital, like emailing, messaging, or keeping documents in a cloud. See also figure 2-2.

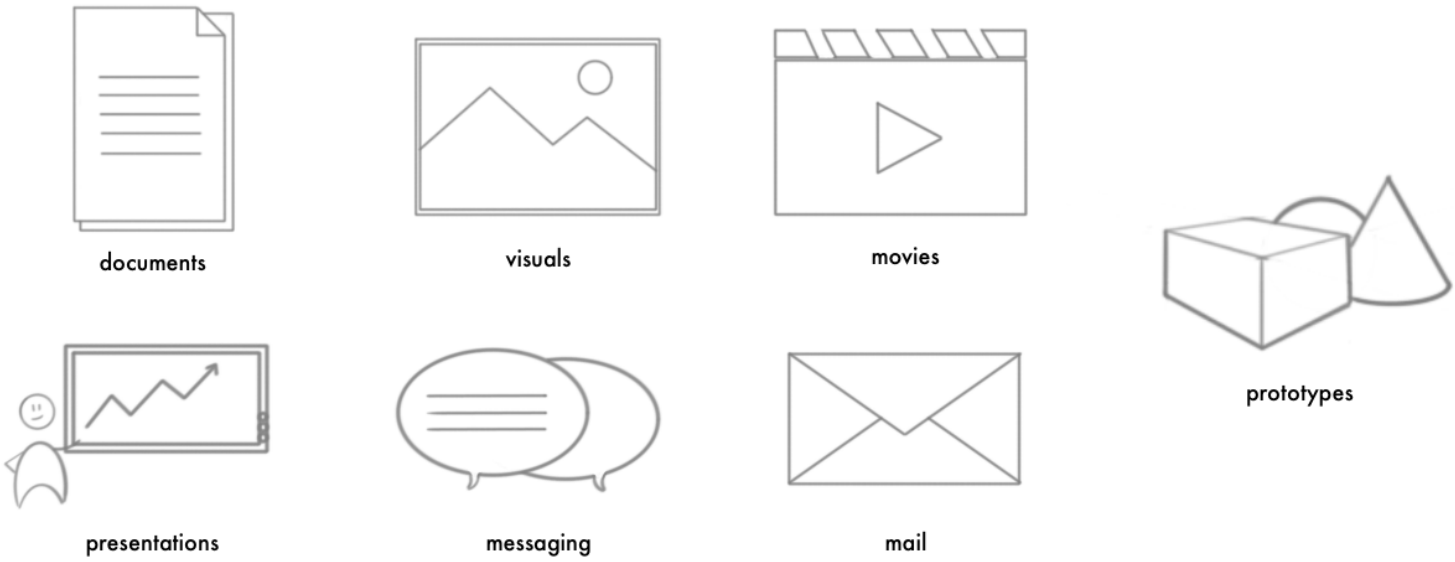


Figure 2-2. Alignment tools used at Ultimaker

2.5. Creating tangible understanding

In a product development organisation, certain tools work better than others. To achieve alignment, the people involved need to understand each other's perspectives and the shared situation (figure 2-1). That is why alignment is embedded in processes. So what kind of encounters and tools should be used in order for people to create shared understanding?

Design-thinking can help in this case, because the way in which designers try to understand their users can also be applied to employees. Sanders and Stappers (2012) propose ways in which different kinds of user knowledge can be gained through various techniques. They argue that some information is latent. Unknown to the target person him- or herself and to be discovered through generative sessions in which new things are being created.

Latent information describe our beliefs and dreams; the emotions that drive us everyday. In the context of a company, it is essential to employee satisfaction. In light of alignment this would mean that for increased mutual understanding employees are aware of their own and each others latent information.

In addition to the need for generative sessions to create alignment, communication through language falls short. According to Gauntlett (2018) and MyFutures (n.d.), who's opinion favors communication through tangible items, language is "a poor means of conveying one's intention accurately in interaction." Adding: "Cognitive overload is a significant constraint leading to inadequate verbal feedback," and "mental fatigue is an added hindrance to knowledge construction and expression confined within a protracted time span." Gauntlett also expresses concerns in relation to power imbalance between people, as this might affect one's engagement. The added arguments reflect notions apparent at Ultimaker as well (see paragraph 2.5).

Because of the reasons mentioned, Gauntlett tries to make a case for creativity, it being vital for innovation and to inspire through the creation of items. This is supported by Korn (2013), who argues that "we engage in the creative process to become more of whom we'd like to be and,

"IT IS THEREFORE ASSUMED THAT THE CREATION OF TANGIBLE ITEMS INCREASES ALIGNMENT BECAUSE IT IMPROVES COMMUNICATION AND MUTUAL UNDERSTANDING."

just as important, to discover more of whom we might become. We may make things because we enjoy the process, but our underlying intent, inevitably, is self-transformation."

A prominent example of a corporate tool that could integrate what Gauntlett and Korn stand for is through the Lego Serious Play method (LEGO Group, 2010). In the method participants are meant to build their response to a challenge by expressing their thoughts with LEGO blocks. However, this method hasn't been tested yet in permanent, continuous alignment practices.

It is therefore assumed that the creation of tangible items increases alignment because it improves communication and mutual understanding.

2.6. Ultimaker's alignment challenges

Although wider trends have been identified that are influencing the way we look at alignment, they are too vague to turn into valuable insights regarding alignment creation at Ultimaker. That is why a client company profile is needed to get a detailed overview of aspects of alignment that are applicable to Ultimaker. Through interviewing employees (see appendix D, E, and G), information was gathered. In addition to the trends three Ultimaker specific problems were identified.

1: Product strategy flow
One of the problems points at the flow of the product strategy. Inherent to any company is that tasks and responsibilities are divided. A downside of this is that, concerning product strategy, some people have more input than others. For those who don't develop the strategy, it is often perceived as coming from the top through a one-way channel. Not only can it be difficult to accept the strategy, but it also affects the quality of projects negatively.

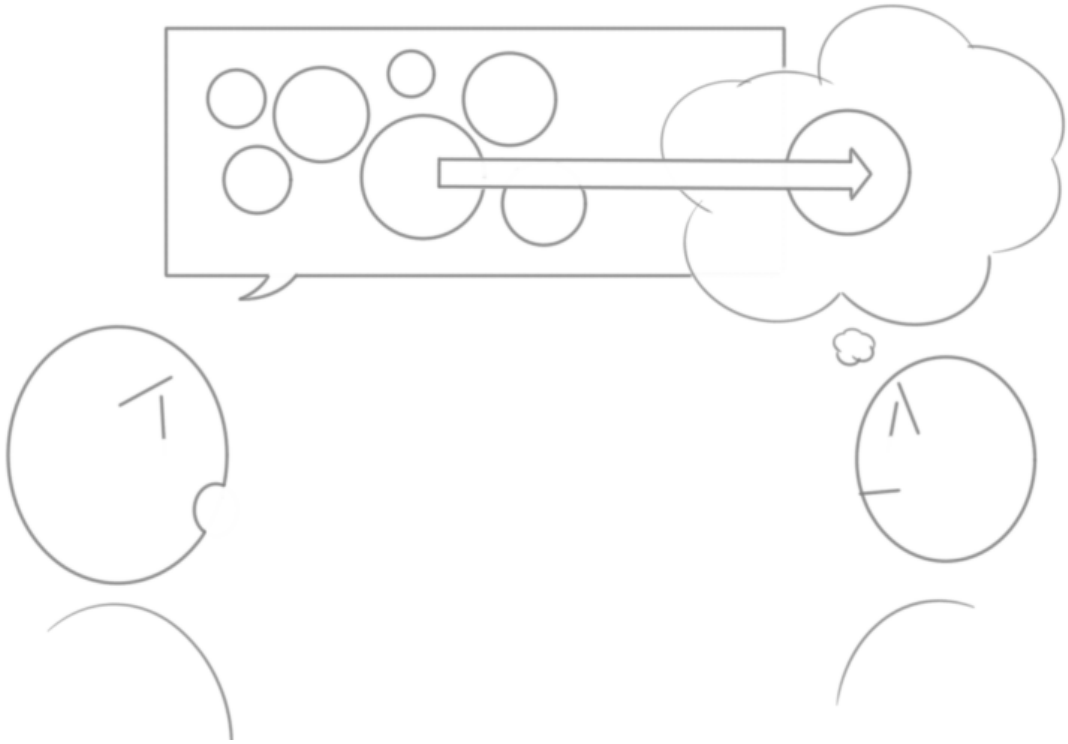


Figure 2-3. Alignment tools used at Ultimaker

2: Complex information
Miscommunication presents itself due to the complexity of information. As mentioned earlier, products and their development are becoming more complex, demonstrated in the many aspects to consider when drafting product strategies. Dialogues focused on product strategy can be confusing due to the large cognitive effort that is needed to keep an overview of the situation. Incomplete information and confusion are the results.

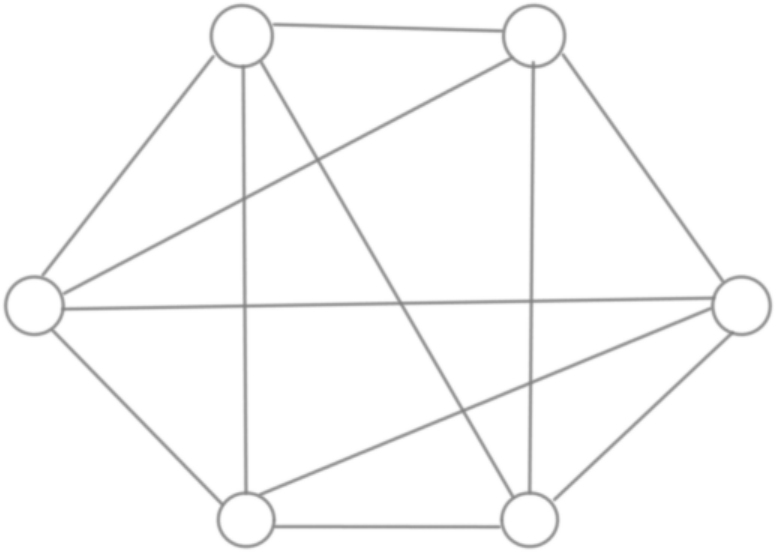


Figure 2-4. Alignment tools used at Ultimaker

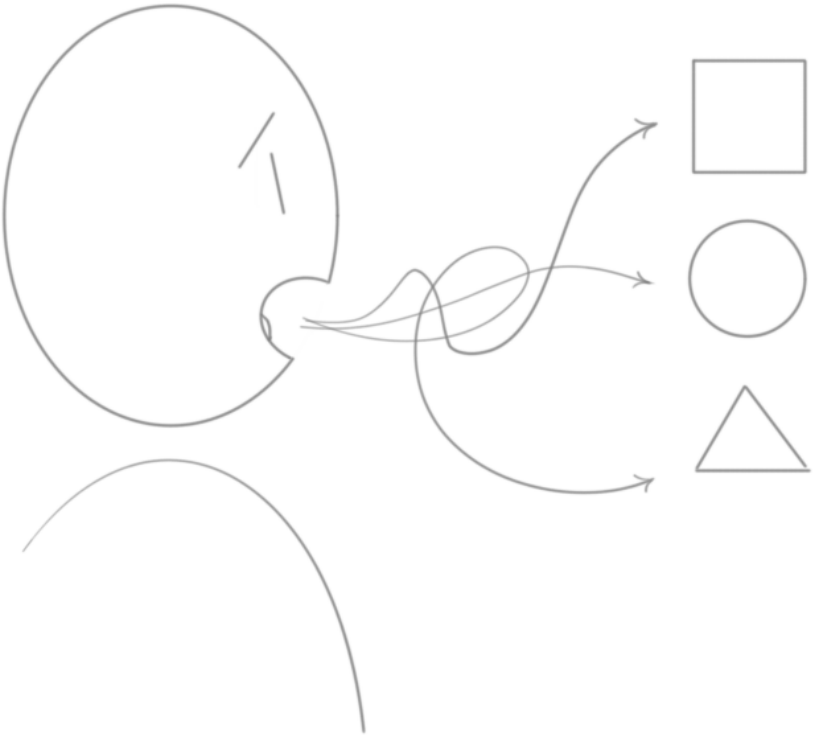


Figure 2-5. Alignment tools used at Ultimaker

3: Abstract knowledge
Another problem is the abstraction of knowledge. What happens when employees talk about strategy, is that it can be interpreted in different ways. That is because discussions surrounding strategy are usually acccompanied by abstract terms and vague definitions. Therefore misunderstandings appear that cause obstructions and might even compromise the company value.

Takeaways from the paragraph
Based on internal research, including interviews with employees from different levels, three main problems concerning alignment on product strategy were discovered. Abstract knowledge can cause misunderstanding, while complex information shapes miscommunication, and one-way communication undermines ownership. These problems are considered main focus points of the project to solve. In the consequent chapters more information regarding the communication and product strategy is discovered to construct viable solutions.

2.7. Concluding the alignment chapter

Alignment can be considered to be consisting out of two components: a shared goal and interrelations between people. This can be tricky to manage because companies engage in partnerships, products become more complex, and interconnections increase. Within Ultimaker these are expressed through problems highlighting the one-way flow of product strategy communication, the abstraction of product strategy knowledge, and the increasingly complex systems in which the company ventures. The way in which companies align is through organizing encounters between employees and providing knowledge systems. Tools are in place to support the creation of mutual understanding. This chapter pleads for an approach that establishes communication through the creation of tangible items. This approach will be linked to the way product strategy is defined and lived throughout the company in the next chapter.

3. PRODUCT STRATEGY FACTORS

3.1. Introduction

The knowledge gained in the previous chapter concerning alignment needs to be applied to product strategy within an Ultimaker setting. Therefore this chapter first explores an overarching principle behind product strategy from literature. This is followed by Ultimaker specific content regarding strategy management that was unconvered by conducting internal research.

3.2. Creating system models

Strategy as a system

A prominent figure in the strategy industry who sheds light on strategy, is Michael Porter. In his article (Porter, 1996) he states that the essence of a company's strategy is in its activities to achieve competitive advantage. It is about deliberately choosing a set of activities that deliver unique value. Fostering a fit between company's activities is therefore a primary goal for strategic management.

How the company chooses its activities is not easy to determine because deciding on a set requires trade-offs. Turning resources in a certain way also decides not to pursue a different lane. Therefore, essential to strategy is choosing what not to do!

To find the best fit of activities, a company needs to look at how activities are combined. A company needs to create a system of activities in which the parts reinforce each other. Market positions built on systems of activities are far more sustainable than those built on individual activities according to Porter (1996).

When talking about product strategy specifically, Melissa Perri (2016) states that it is "a system of achievable goals and visions that work together to align the team around desirable outcomes for both the business and your customers," supporting Porter's statements.

Systems modeling

It is Tom Wujec (2015) who elaborates by explaining that product strategy can be described through systems models consisting of nodes and links. This notion of 'systems thinking' is best explained through an exercise he likes to perform. In the exercise participants are asked to draw how to make a toast without using any words (see figure 3-1).

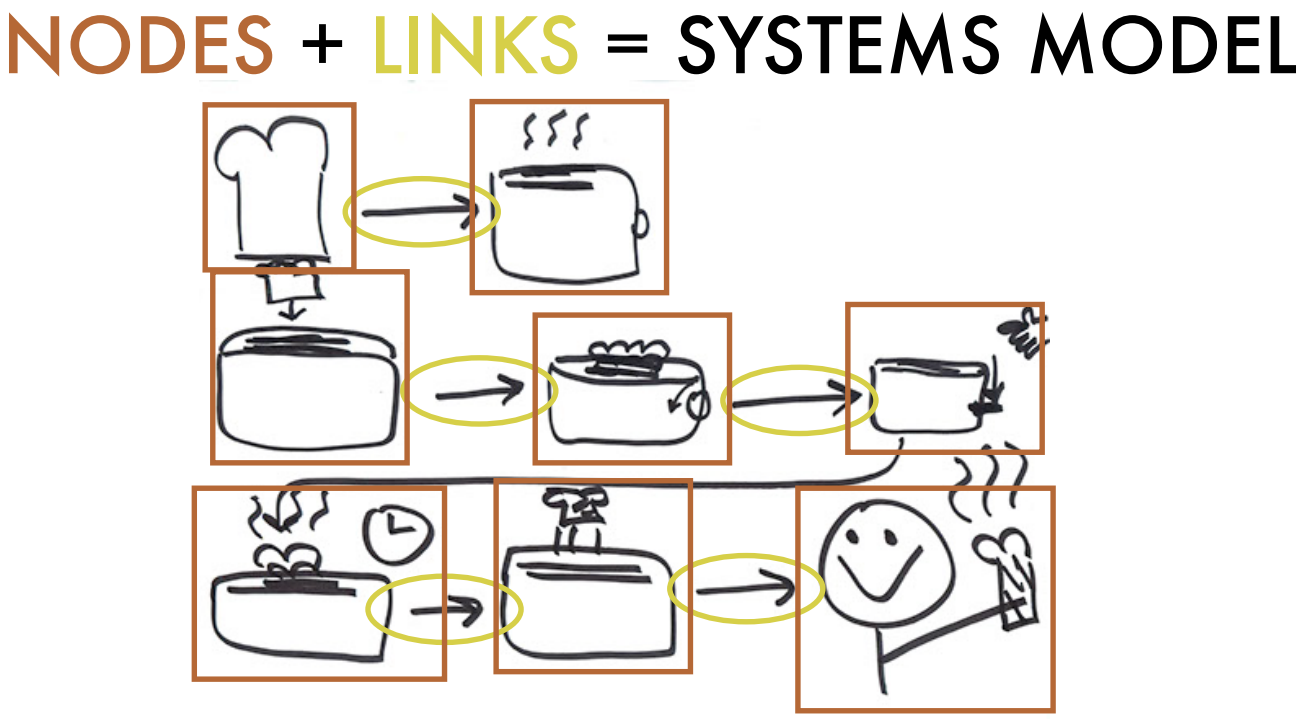


Figure 3-1. Systems model (Wujec, 2015)

Systems models become really valuable when they are created in teams. The unified systems models function to create engagement from all participants, create an overview of the situation, and assign meaning to the nodes and links.

Translating the meaning of Wujec's systems modeling to product strategy, relations can be made between strategic components and nodes, and structure and links. Therefore an investigation of strategic components and strategy tools is needed.

Strategy tools

The way in which companies organise their product strategy varies. Many tools have been developed to make product strategy insightful. Most interesting ones relating to the creation of systems models are listed below (see also appendix F):

- Business model canvas (Strategyzer, 2010)
- Product roadmap (Simonse, 2018)
- Product strategy canvas (Produx, 2016)

What these structures have in common is that they make distinctions in topics or aspects. For example, the Business Model Canvas has different sections for market segments and channels. These structures benefit the communication between employees because it creates overview.

Strategy components

The contents of the strategy tools represent the product strategy components (e.g. personas, values, and revenue models). A company can make a choice to decide for a certain market segment, thereby neglecting others. This choice has significant effect on the value the company is developing. Components of strategy are different for each company, therefore the Ultimaker product strategy is analysed.

3.3. Ultimaker product strategy operations

Ultimaker operations are presented to create an overview of the context in which the concept will be placed. Already having identified alignment issues in the previous chapter, the main focus here is on the structures in place and the stakeholders involved in the strategy. First, key strategic content the company uses to drive product development is explored, followed by the strategic flow in which this is communicated, and finally an overview of employee segments is presented.

Product strategy structure

Ultimaker's product strategy is managed by the Product Management department. The product strategy consists of the projects the company is engaging in and what the value propositions of the cases are. To illustrate how this works, a visual is constructed to highlight the involvement of stakeholders and the different stages of product strategy.

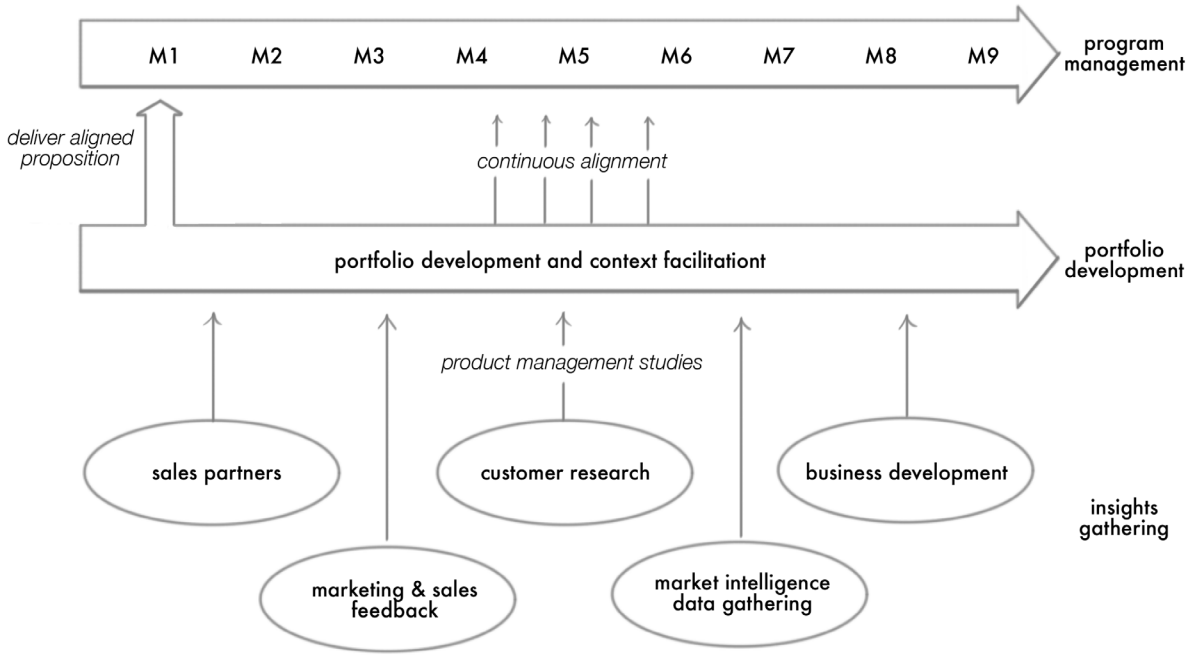


Figure 3-2. Product strategy structure

Figure 3-2 illustrates the connection between the product life cycle and the insights, at Ultimaker. Through the milestones, represented by the M1 to M9 stages (i.e. the funnel) in the figure, a project is managed. Each project is governed by a 'project committee'. Projects are dependent on information coming from various sources, as can be seen in the bubbles in the bottom of the figure. It is Product Management's job to conduct the studies, synthesize the information and communicate this to the project committee members. To structure the projects the funnel is divided by the four departments to manage the different product types.

The funnel is characterised by three main processes, each controlled by an independent board (see figure 3-3). The different boards manage the progress of the projects and ensure the viability of the project. The Portfolio Board's responsibility is to create propositions and technology options. The project committees are responsible for the integral project management. Finally, the issue and change board concerns itself with the phasing out of products and issue management.

Figure 3-3. Funnel break-down

To facilitate communication between the boards, multidisciplinary teams are formed and overseen by leads from every department. Especially in the value proposition, development, and launch phase, the product strategy is often changed and updated. These changes need to be communicated to all stakeholders, but due to the company's growth it is becoming more difficult to manage this communication effectively.

That is why tools are being put into place such as the funnel deliverables and program management. These work really well to keep track of detailed work in projects, but also cause confusion as to what is essential to the project. Ultimaker has a product management team in place to generate holistic views of the roadmaps and projects. Doing so requires them to synthesize data into more comprehensible knowledge.

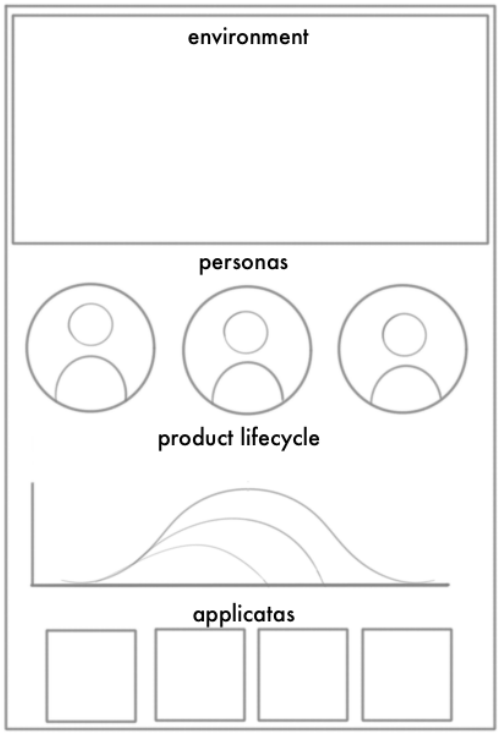


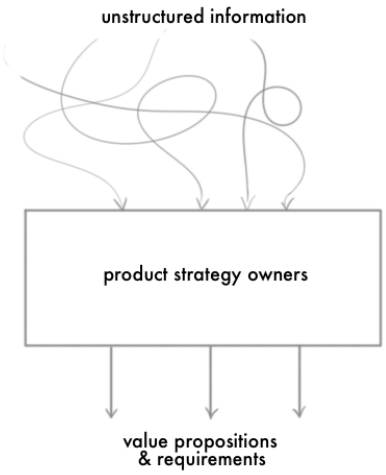
Figure 3-4. Product strategy content

Product strategy content
The comprehensible knowledge is also known as the product strategy content. At Ultimaker the product strategy content is rooted in both market and technology analysis.

Synthesizing the market and technology input has resulted in the creation of environment descriptions. The environments are a way to describe the context of active markets in terms such as places, personas, and applications (see figure 3-4). It creates consistency and overview over the context in which products will be placed.

Strategy content is always under development. No two project have the same parameters. Therefore tailor-made content needs to be created for each project. However, overlap does exists and therefore recurring ideas can be captured.

Product strategy stakeholders
So who manages all this information? Through interacting with different employees at the company and discovering their roles, three key stakeholder groups were identified. Each dealing with product strategy in a different way. The key stakeholder groups consist of product strategy owners, translators, and receivers.



Product strategy owners
The owner group consists of product managers who set out the main strategic directions. These are represented by product management members. Situated in the beginning of the product lifecycle they are responsible for the project candidates. Following the project throughout its lifecycle, they guard the value proposition.

Focus: creating a coherent story, new opportunities, guard value proposition

Product strategy translators
The translators are middlemen who stand in between the receiving party and the owners. Project leaders are in place to connect the high level strategy to action points. They are responsible for the execution and alignment of the projects.

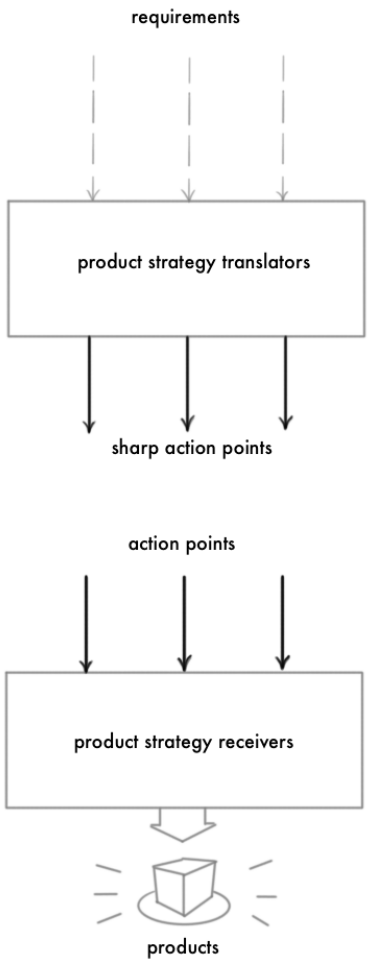
Focus: project planning, sharp requirements, meeting expectations

Product strategy receivers
Finally, the product strategy receivers are the ones realizing the projects. Due to the combined skills in multidisciplinary teams they manage to tackle complex product development projects. This group is the largest of the three. Because of the multidisciplinary nature, it may be hard to communicate as members have different perspectives and priorities.

Focus: clear targets, tailored solutions, multidisciplinary

Interactions between the groups
Communication between the groups is something that needs to be managed well. Mentioned in paragraph 2.4 it is important to acknowledge differences between people. Due to the differences inherent to the groups, it is hard to create shared understanding. Two factors play a role in this: the level of specified knowledge the stakeholder holds and the nearness to the insights. Figure 3-5 highlights these differences.

The differences between the stakeholder groups are influenced by the job description. The owner group has to communicate a lot with external sources as well to create visions and set the right requirements. They have a managing role and therefore don't have specialised skills (e.g. programming knowledge, mechanical engineering, and material science). The translators need to navigate between the owners and receivers. Because they need to be able to hold substantive conversations with the owners as well as the receivers, they are situated in between the two groups on the the two scales. Finally the receivers are the people realising the products with their specialised skills. What is notable is that, in general, their job requires them to be more focused on the technical feasibility of the vision.



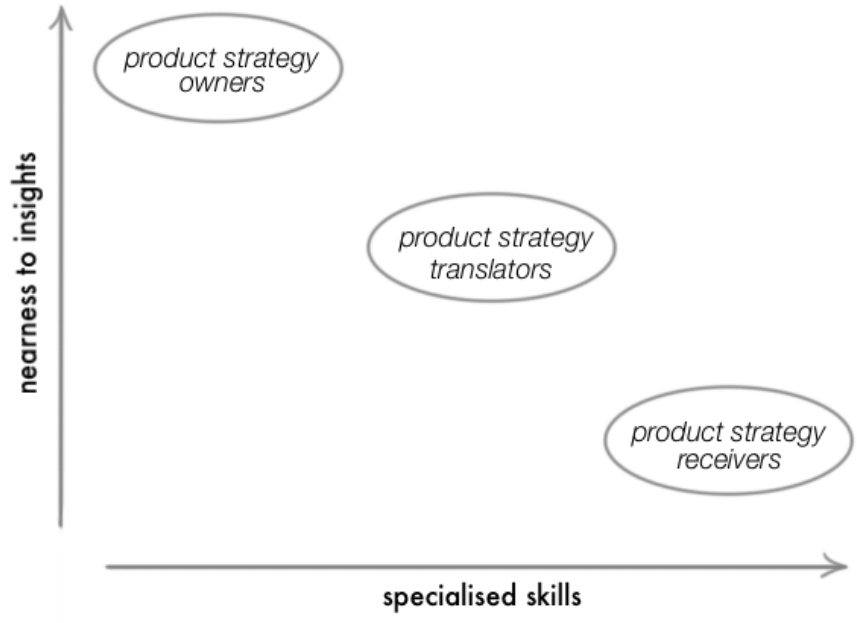


Figure 3-5. Stakeholder differentiations

The structuring of communication between the stakeholder groups
Ultimaker facilitates communication between stakeholders through different types of meetings in which product strategy is discussed. In table 3-1 the meetings are ordered hierarchicaly. Appendix H continues to describe the sessions in detail.

Session	Responsible	Goal	Content	Stakeholders	Session
strategic	PM manager	strategic proposal support	context, concept, visualisations	MT	strategic
portfolio	portfolio manager	roadmap/product concept choice	context, concept, visualisations	PC, SDB, BD	portfolio
technology	CTO	technology roadmap choice	context, cohesion, total aspects	PC	technology
program	program manager	progress, validation, and alignment	progress, issues, validation	PDB, PCB	program
project	project leader	product profile and scope	product context, needs, issues	Team, PM	project
department	department manager	operations management	resources	PM, Department management	department

Table 3-1. Meeting types

During the exploration of the different meetings, three key communication goals were defined that are applicable to the three stakeholder groups: product strategy creation, product strategy dissemination, and product strategy consult (see also figure 3-6).

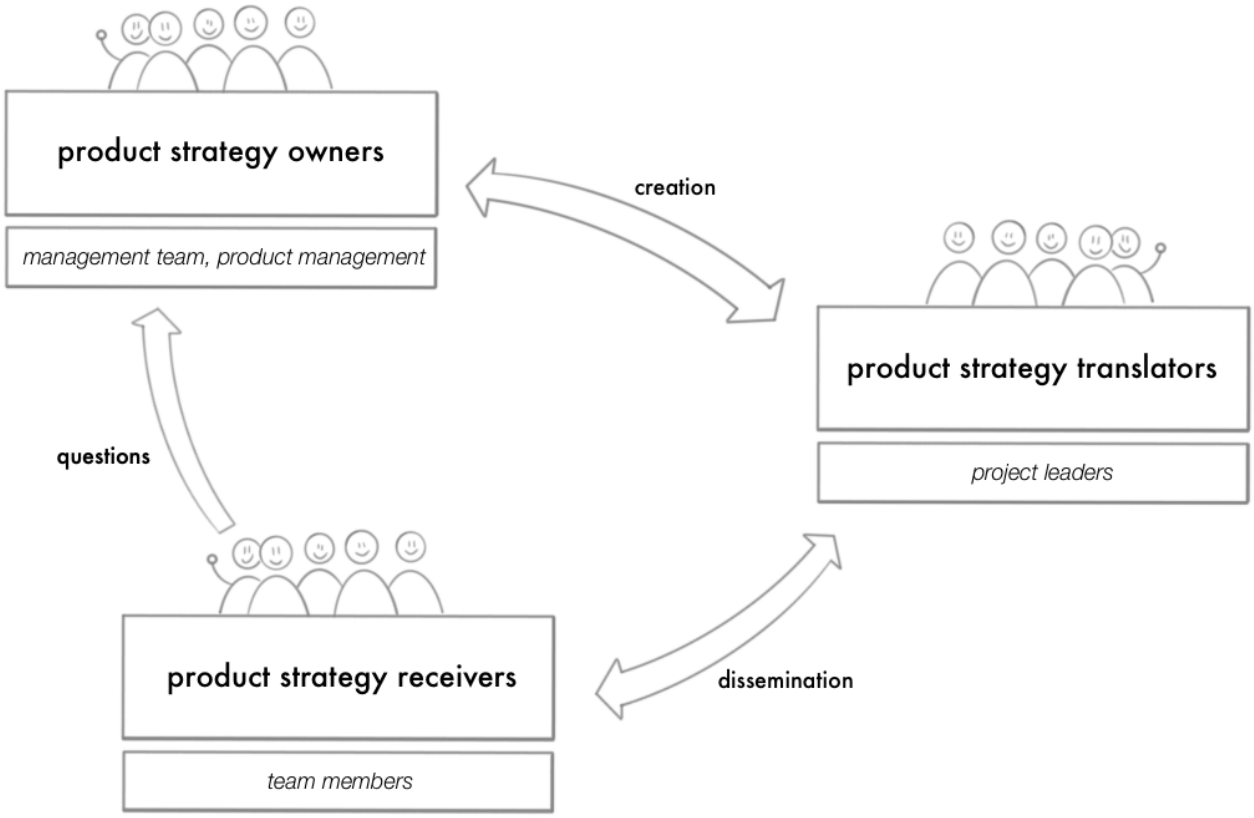


Figure 3-6. Product strategy stakeholder groups

3.4. Concluding the strategy chapter

"PRODUCT STRATEGY IS MADE UP OF SYSTEMS MODELS THAT REPRESENT DIFFERENT PARTS OF A COMPANY'S VISION AND PROJECT COMPONENTS"

The goal of the product strategy chapter was to create a common understanding of what product strategy is and how it is arranged in Ultimaker. We concluded that product strategy is made up of systems models that represent different parts of a company's vision and project components. They are structured in such a way that makes sense for the stakeholders involved. At Ultimaker three groups of people have been identified to interact with product strategy in different ways. The owners are responsible for the creation of value propositions and the requirements for the projects, the translators are the middlemen, ensuring the realisation of the projects. The receivers are represented by the teams creating the actual products. Alignment on the product strategy is needed and accounted for in various meetings which are listed in table 3-1.

In the next chapter this information will be used in combination with the conclusions of the alignment chapter. In that way the product strategy is closely connected to the way people align at Ultimaker and ensure that the solution is directed towards the inclusion of these two topics.

DEFINE

The define phase presents the framework that is used to prepare for the develop phase. First a section of the War room is selected. A design brief concisely presents the problems, constraints and considerations, goals, risks, benefits, and planned solutions that underly the development of alignment options.

4. SCOPE

4.1. Introduction

The chapter describes the focus, goals, and evaluative characteristics of the project by using the knowledge obtained in the previous chapters. In addition, experts were interviewed in relation to the subject of War room unattended to in the alignment and strategy chapters.

4.2. Creating focus on the solution

The project focusses on creating alignment on product strategy. In the efforts of doing so the company has decided to create a, so-called, War room. This room's reason for existence is to help in achieving alignment. The given design assignment included a physical space. In this paragraph the focus is established by looking into how the alignment and product strategy factors can converge in the physical space.

A War room is often described as the nerve center in companies. Experts were approached with the intent to discover more about what a War room is and how it should be used in relation to product strategy and alignment (see also appendix B and C). The experts, being strategy specialists at Océ, TomTom, Adidas, Livework, Flatland, Handmade, and Wildchild Innovations, mentioned three aspects to be most important:

- create a process or activities that are fundamental to the room
- mandate a person to manage the room
- facilitate the creation of tangible objects

Based on the experts recommendations the concept should provide encounters between employees led by a facilitator in which physical objects give shape to the discussion.

Organising a War room can target many aspects (see also figure 4-1). The focus will be on the creation of activities and tools in meetings. The tools and activities impact alignment the most and have priority over other aspects.

Figure 4-1. War room aspects

4.3. Design brief

To create a clear overview of the define phase a concise design brief is presented to highlight the most important insights and set the stage for the develop phase. The problem, constraints, goals, risks, benefits, and planned solutions are touched upon.

Problems
The problems to be tackled are:

- misscommunication because product strategy information is ambiguous and abstract
- confusion because of complex product strategy content
- lack of engagement due to top-down communication of product strategy

Constraints and considerations
The project knows some constraints and considerations:

- the solution should create overviews of the product strategy
- the solution should be applicable to a designated space
- the solution should be a permanent addition to the Ultimaker headquarters
- the solution should connect to the stakeholders' characteristics

Goals
Based on research the following design goal is formulated:

"My design goal is to create a tangible product strategy tool that supports alignment among Ultimaker employees."

In order to achieve the design goal, sub-goals are formulated, highlighting key aspects:

- creating cross contamination between departments
- highlighting interrelations between product strategy components
- creating an overview of product strategy
- promoting the use of boundary objects
- enabling the saving of product strategy information generated during meetings

Risks

Risks to the project are:

- the solution will not be accepted by the employees
- the solution will be neglected over time
- the solution does not suffice in making product strategy insightful
- the solution requires too much effort to use
- the solution does not create engagement from stakeholders
- the solution does not create unambiguous results

Benefits

Main benefits of the solution should be:

- creating unambiguous product strategy content
- creating clear overviews of complex product strategy content
- creating engagement from all participants during meetings
- creating consistency

Planned solutions

Possible areas that might offer opportunities to the design goal are:

- the facilitation of storytelling
- co-design during meetings
- gamify systems modeling

In the ‘develop’ phase the different options are explored. Their appearance here is to kickstart the generation of ideas. These planned solution areas are not fixed. They were generated based on knowledge of the researcher.

4.4. Criteria to evaluate the concepts on

Finally the concepts will be evaluated based on the criteria listed below. The criteria originate from the problem statement, research on alignment and product strategy, and expert recommendations.

- highlights interrelations (alignment)
- communicates the shared goals (alignment)
- clarifies product strategy (assignment & product strategy)
- creates engagement (alignment)
- effective usage of boundary objects (alignment)

4.5. Conclusion

This chapter has defined the different parameters to prepare for the develop phase. It started by reflecting back to the company condition that the solution is to be embedded in a permanent space. Furthermore, a proposal for a meeting process was defined in order to create a limitation in which solutions can be explored. Finally a very concise design brief is presented that summarizes the findings and closes the define phase.

DEVELOP

The develop phase is characterised by the development of ideas and iterative processes that contribute to the embodiment of a viable solution. Proof of concepts and tests are used to optimize the final concept which is presented in the next phase.

5. IDEATION

5.1. Introduction

The ideation chapter starts with an explanation of the different approaches that were deployed to generate ideas. Following the methods used an overview of preliminary ideas are mentioned. The ideas are filtered and transformed into concepts. In the end a concept is selected.

5.2. Generation of ideas

Idea generation approaches

The start of the ideation phase began by using a structured approach as to which methods to deploy. Many methods included the help of external people. The following methods were used:

- braindumping
- inspiring Stories
- how tos
- reframing
- what ifs
- expert recommendations

At the start, braindumping was used to clear the fog in my head. This resulted in, mostly, obvious solutions. In need for more extreme and out-of-the-box ideas, Inspiring Stories were utilised (see also appendix I). Two separate sessions were prepared in which participants were asked about their most favorite gathering to identify success factors. Asking for the reasons why the encounters were so successful resulted in overlapping requirements:

- there was always a shared activity
- in many cases there had to be a central focal point
- people felt a sincere interest in each other
- a condition was to feel safe and at ease

These requirements were used in the setting up of How Tos. Together with design students the How Tos were answered.

- How to expose relations?
- How to communicate visions?
- How to exchange strategy information?
- How to create a safe environment?
- How to capture inspiration?
- How to create empathy?
- How to exchange information?
- How to spark spontaneity?
- How to trigger discussions?
- How to bring people together?

Adding up to the pile of ideas, another perspective for the How Tos

"INTERESTING IS THE DIFFERENCE BETWEEN CONNECTING PEOPLE AND CONNECTING THE PRODUCT STRATEGY COMPONENTS"

was explored, this time with the process described in the define stage influencing the How Tos formulation:

- How to initiate purpose?
- How to gather participants?
- How to create boundary objects?
- How to share findings?
- How to make decisions?
- How to save information?

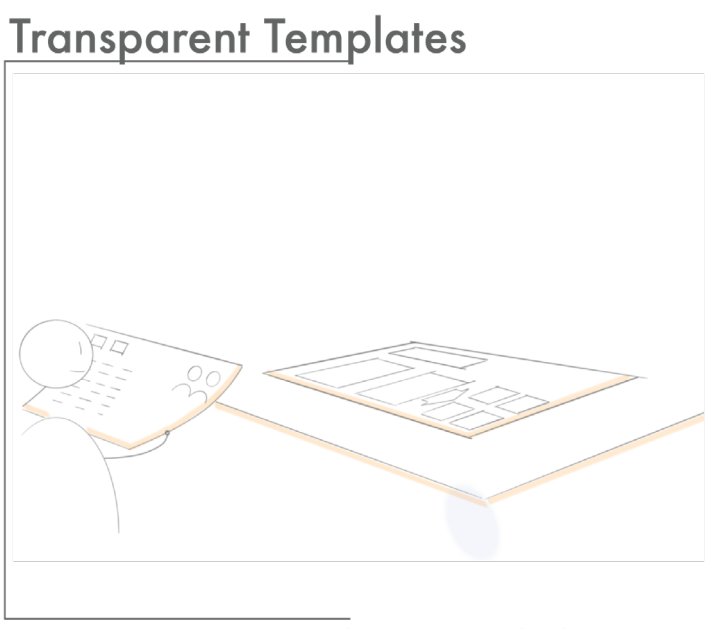
Adding to the amount of ideas were methods like Reframing, What Ifs, and suggestions made by the same experts contacted earlier.

Preliminary ideas

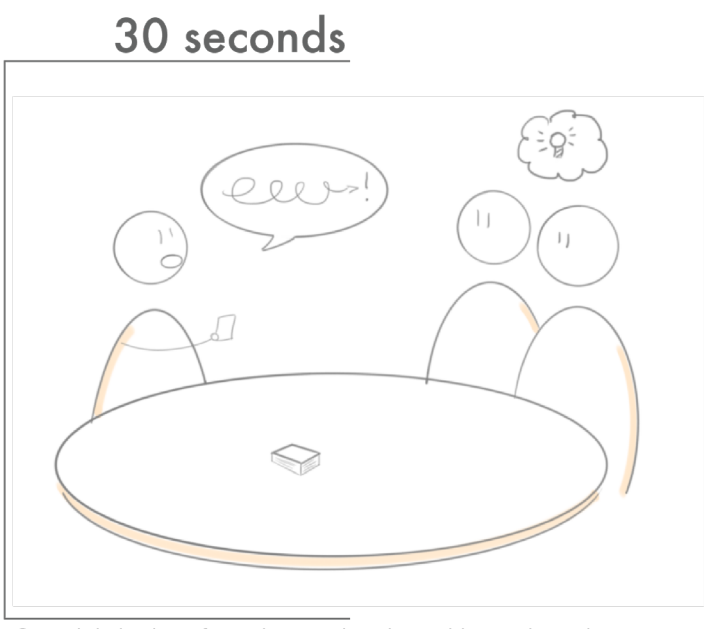
The ideas coincidentially resulted in tools that support meetings. Mentioned in the previous chapter were some planned solution areas. A selection based on gut feeling of the most interesting ideas in each of the areas can be seen in figures 5-1, 5-2, and 5-3.

The storytelling ideas focus more on creating a comprehensive story, the reasoning behind the product strategy system. The co-design are directed to bringing together people's objectives. Finally, the gamify ideas focus on the fun aspect of product strategy systems. This distinction was made to find characteristics of the ideas. Overlap exists, but the distinction helps to create a mental overview.

Interesting is the difference between connecting people and connecting the product strategy components. Also a notable difference is the focus on the process on the one hand and the results of the exchange on the other.



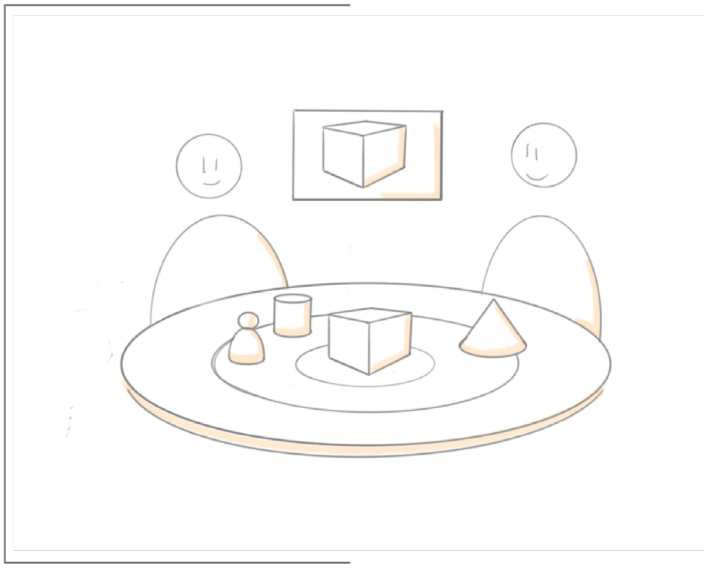
Transparent papers are used to create overlap between different levels of detail. Each level has a different level of detail that connect to the other layers.



Special decks of cards are developed based on the content of a specific issue or project. The cards make sure different perspectives are discussed.

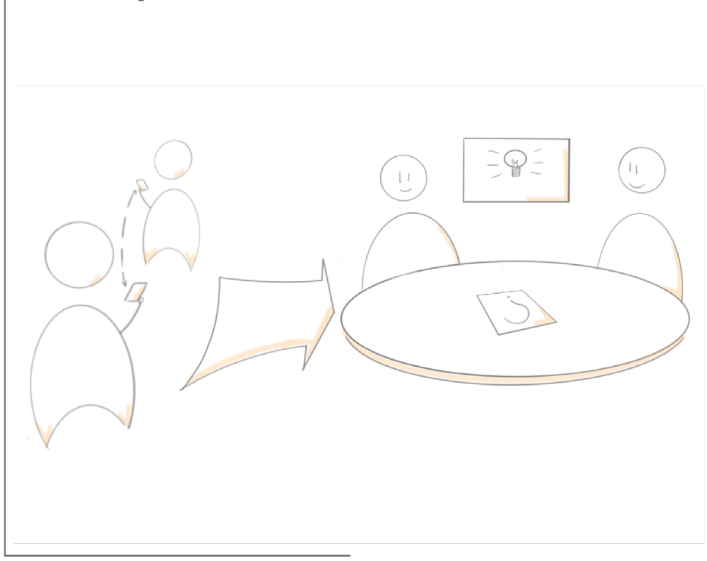
Figure 5-1. Storytelling

Battlefield



Objects on the table represent parts of a project or strategy model. By placing the part that is the focus of the meeting in the center, its corresponding topics can create an overview of the situation.

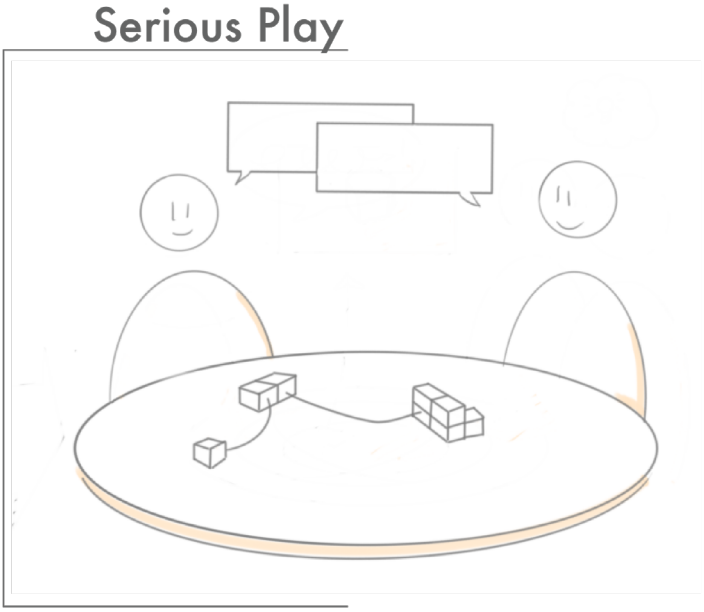
Speed date



Through an online platform issues can be posted. The system will connect two people relevant to the issue and gather them in the war room to creatively solve the issue.

Figure 5-2. Co-design

Serious Play



Through the creation of physical representations of discussions, communication becomes much more tangible and clear.

Cookin pot

Ingredients, representing different options or parts, can be mixed in the pot and will develop different compositions.

Figure 5-3. Gamify

5.3. Concept development

Selection and merging of preliminary ideas
The ideas that are deemed suitable for the creation of systems models are Transparent Templates, Battlefield, and Serious Play. The development of concepts resulted in combined ideas because several aspects complement each other.

The structure the Transparant Templates offer can be applied to the Battlefield and Serious Play ideas. This would mean that the objects generated during the latter ideas will be located in the designated areas on the templates. These three ideas will make up the concepts presented next.

Concept presentations
Each concept is discussed based on the following topics:

- Key aspects
- Walkthrough of the concept
- Concept realization

5.4. Transparent Templates explained

The first concept is the Transparent Templates. Being an iteration of the preliminary idea, this concept resembles the ‘Hamertje Tik’ game for kids. Just like in the game, the participants need to fill the template with project components by writing the content on fitting blocks.

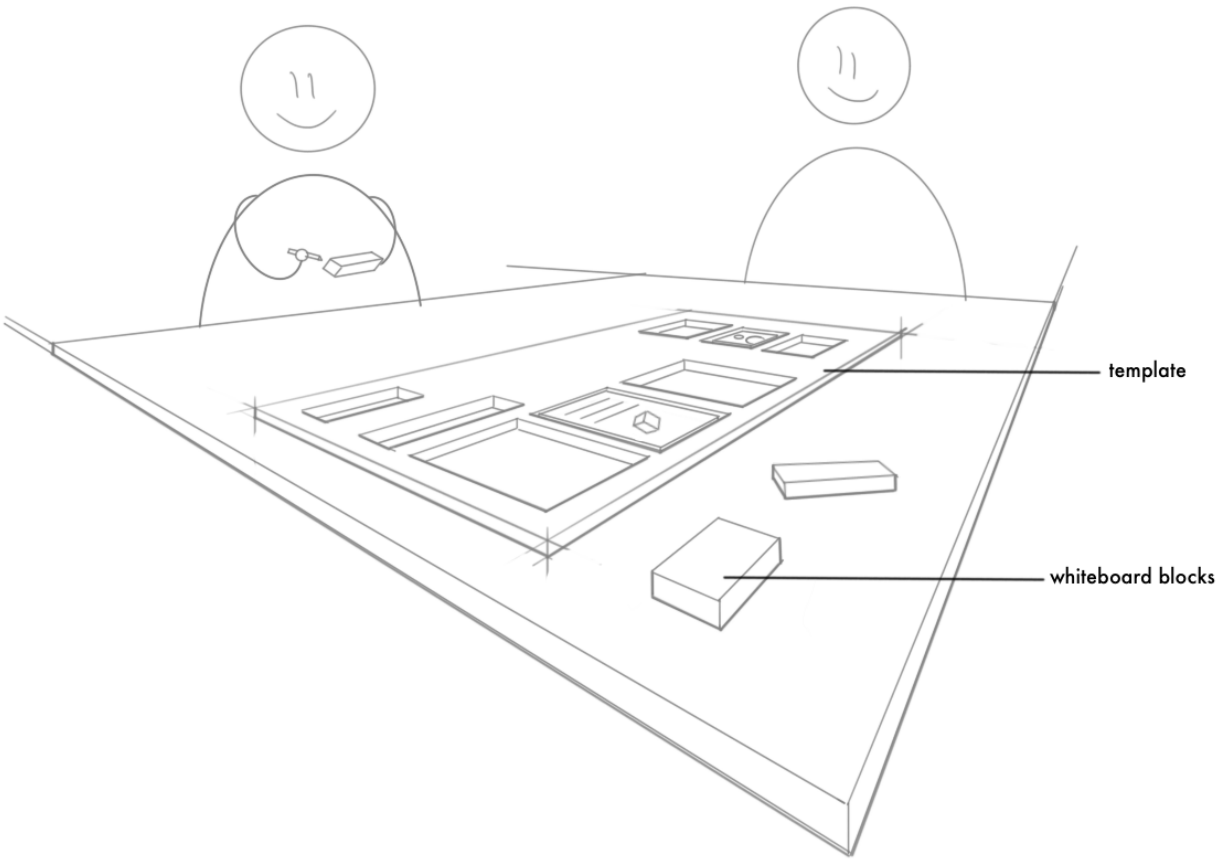


Figure 5-4. Transparent Templates

Key aspects
Key aspects are:

1. Template
The template is a way of structuring product strategy discussions. The template exists of a, possibly wooden, frame with sections cut out. The cut out sections are placeholders for the building blocks. The sections have cut out in such a way that different product strategy topics are represented by the holes such as personas, or value propositions, needs, resources, etcetera.

2. Building blocks
The building blocks are forms that fit in the cut outs of the template. The blocks can be written upon with whiteboard markers to create the content.

3. Storage
The templates are stored in the War room. In this way they are accessible anytime of the day. The walls in the War room reflect the vision and strategy of the projects.

Walkthrough of the concept

1. Choose the appropriate template
Before the meeting one of the templates is chosen. Various templates exist to cover multiple goals. The goal of the meeting is decided upon beforehand and an applicable template is selected. An existing template, already developed in earlier meetings, can be chosen as well. In that case the template is further developed.

2. Hand out the building blocks
At the start of the meeting a set of building blocks is present. The building blocks fit in the gaps of the template. Each of the participants receives a set of building blocks.

3. Discuss different options
During the discussion, the focus goes to the different options proposed for the blocks. As not all blocks will fit the template in the end, the ones that make the most sense must be chosen.

4. Finalize the template
A final version of the template is decided upon and the meeting is closed.

5. Store the template
The template is stored by digitizing the content, hanging it up on the wall, or storing it in a cabinet.

Concept realization
The concept is being realised by the War room manager. The War room manager acquires the tools or orders the necessary components. In doing so he needs to research what templates are optimal and what guidelines need to be in place. The components needed are:

- whiteboard markers
- wood
- whiteboard
- template layouts
- session guidelines
- display unit

5.5. Battlefield explained

The second concept, Battlefield, resembles the classical conception of how medieval generals would move pieces representing armies across a big map on the table. In the same fashion objects carrying product strategy meaning, are placed on and moved across the categorizing structure on the table.

Key aspects
Key aspects are:

1. Structure
The structure on the table reflects categorizations of product strategy topics. Different structures can be created for a mulitude of purposes. The structure exists of whiteboard material on which the building blocks can be placed. The different sections are added by placing tape on the board.

2. Building blocks
The building blocks are objects representing specific product strategy parts. Many building blocks can be imagined, therefore, in order to create contrast between them, they are shaped and coloured differently. They will be shaped according to iconic or symbolizing materializations of the product strategy part. Besides, they may vary in size and colour to make them more distinct from each other and create a hierarchy. Finally, they will have magnetic properties so that they stick to the whiteboard structure on which they will be placed.

3. Storage
The systems models are present in the room. The magnetic systems models can be hung on the walls. The models are also digitized by photographing the systems model and storing them in ERP systems.

Walkthrough of the concept

1. Choose the appropriate structure
Before the meeting one of the structured templates is chosen. Various templates exist to cover multiple goals. The goal of the meeting is decided upon beforehand and an applicable template is selected. A structured template developed in earlier meetings can be used as well to continue the work already done.

2. Gather the accompanying building blocks
At the start of the meeting the building blocks belonging to the template are dispersed around the template in the middle of the table, within reach of the participants.

3. Create an overview of the product strategy during discussion
The meeting's goal is presented. Using the building blocks, which stand for product strategy parts, the participants can play with the arrangement of the items on the structured template to answer to the challenge. The building blocks can be used:

- individually as focal points of discussions
- in addition to other objects, creating enriched meaning
- in connection to each other, revealing relations
- in comparison to each other, revealing considerations

In addition, whiteboard markers can be used to add extra information, like lines between objects, or annotations near an object. The arranging activity creates a reflective process that generates better results.

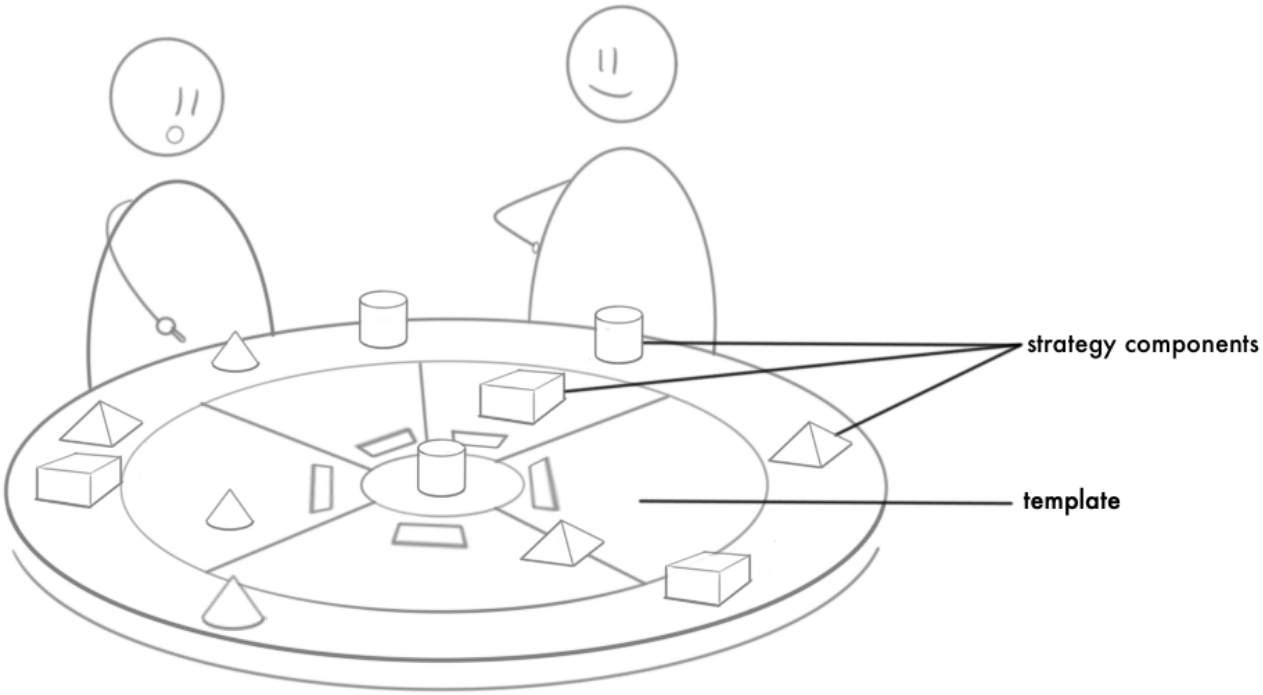


Figure 5-5. Battlefield

4. Decide on a final systems model
In the end an overview of the systems model is fixed and the meeting is called to an end.

5. Store the systems model
The systems model is stored by digitizing the content and hanging it up on the wall or storing it in a cabinet.

Concept realization
Prior to the concept's launch, the War room manager needs to develop the building blocks and the layout of the structures. To construct the concept the following items need to be in place:

- whiteboard templates
- whiteboard markers
- building blocks (possibly 3D-printed)
- session guidelines
- display unit

5.6. Serious Play explained

The final concept, Serious Play, is defined according to the LEGO Serious Play method. The concept is built on the assumption that LEGO blocks form a powerful means to develop, capture and share rich knowledge. Participants are reminded of their youth in which they used LEGO to express their imagination.

Key aspects
Key aspects are:

1. Structure
The structure on the table reflects categorizations of product strategy topics. Different structures can be created for a mulitude of purposes. The structures exists of printed papers that can be placed on a table.

2. LEGO blocks
A selection of LEGO blocks is sorted out. Through combinations of LEGO blocks product strategy parts can be created.

3. Storage
The systems models are photographed and stored in ERP systems so that employees can access them.

Walkthrough of the concept

1. Choose the appropriate structure
Before the meeting one of the structured templates is chosen. Various templates exist to cover multiple goals. The goal of the meeting is decided upon beforehand and an applicable template is selected.

2. Create an overview of the product strategy under discussion
The meeting's goal is presented. Using the LEGO blocks metaphorical product strategy content can be created to make ideas explicit. The participants can play with the arrangement of the items on the structured template to answer to the challenge. The facilitator may choose to first build individually before collaborative activities are engaged.

The building activity creates a reflective process that generates better results.

3. Decide on a final systems model
In the end an overview of the systems model is fixed and the meeting is called to an end.

4. Store the systems model
The storing of the systems model can be done through digitization of the result. The LEGO blocks are photographed and sent out to the people involved.

Concept realization
Prior to the concept's launch, the War room manager needs to prepare the LEGO blocks and templates. The manager also has to consider how the information captured in the LEGO blocks are communicated. To construct the concept the following items need to be in place:

- template layouts
- LEGO bricks
- session guidelines
- storage space

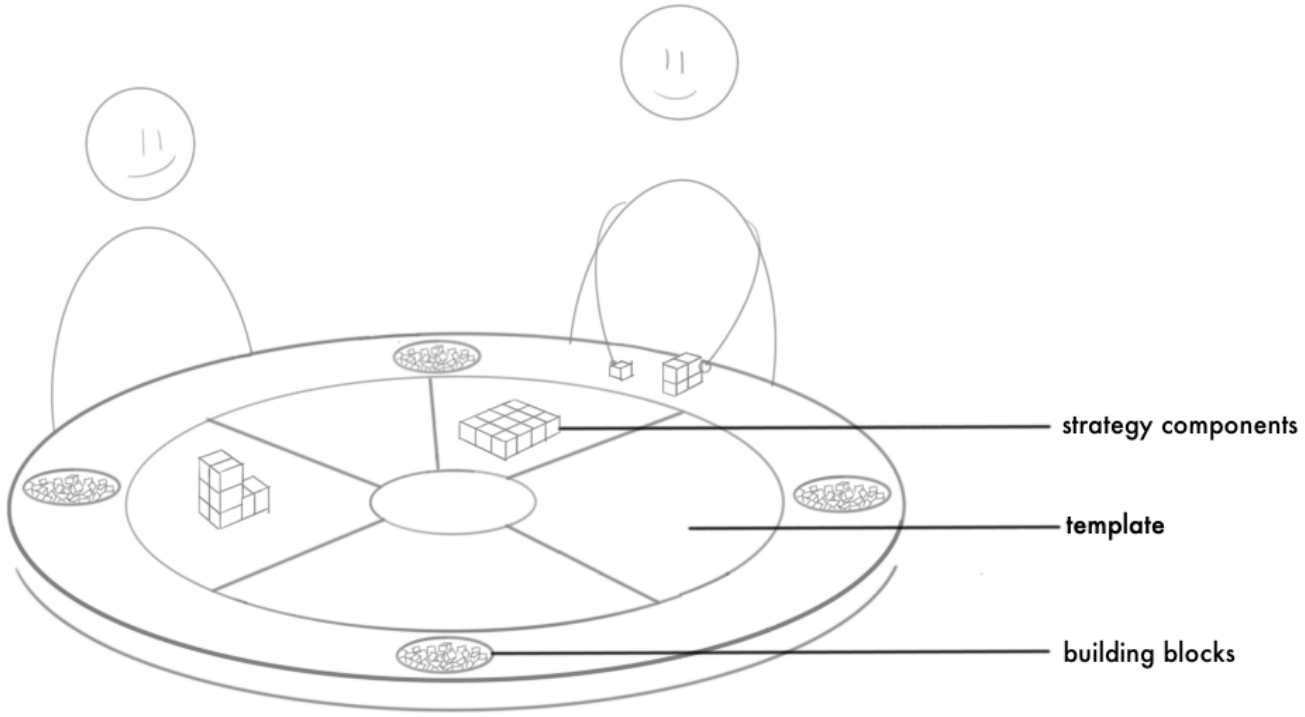


Figure 5-6. Serious Play

5.7. Hygiene factors

Applying to al the concepts are a number of so-called hygiene factors. The hygiene factors describe boundary conditions. Hygiene factors include the responsibilities of people for the concepts to be organized and the rules the participants have abide by.

Responsibilities
Some responsibilities need to be imposed:

- A War room manager arranges for the different templates to be chosen from.
- The War room manager instructs the users of the room about its procedures.
- The facilitator of the meeting, the person who instigated it such as a project leader of product manager, is in charge of deciding upon a template.
- The building blocks and templates are are present in the War room, managed by the War room manager. This person ensures the presence of the necessary conditions to conduct the meeting.
- The facilitator of the meeting ensures that the goals of the meeting are met. This requires him to actively involve participants, lead the decision-making process, and ensure time-keeping.
- The War room manager is also held responsible for the storing of the template, however that is done.
- The War room manager is also responsible for supporting the facilitators and the participants in the execution of the meetings.
- The War room manager is also responsible for the arrangement of the War room itself. He updates the arrangement of the room and ensures that the walls provide an overview of the product strategy and mirror the results of the discussions.

Rules

The rules are based on a set of etiquettes formulated by the LEGO Serious Play method (LEGO Group, 2010). They make a distinction between the participant and the facilitator since they have different roles to fulfill during the meeting.

Participant

- The facilitator poses the challenges, sets the agenda, and guides the process
- The model is your answer to the challenge
- There are no wrong answers. The models aesthetics are subordinate to what the participant is able to share and describe
- 'Think with your hands', just start building even if you don't know what to build
- The meaning of your model is in the hands of the builder. Therefore the focus should be on the model and others can ask questions regarding that model
- 'Listen with your eyes', try to understand shared models through looking at the model
- Everybody is expected to participate throughout the process

Facilitator

- Maintain flow in the process. Be process-oriented and aware of participant's needs
- Develop challenges suited for the participants' prior knowledge
- Challenges are to be build individually at first to allow for individual to group reflection
- Keep the focus on the system models
- Ensure everyone has a say in the process

Process

Besides the responsibilities and rules, a process has been defined to accommodate the creation of tangible objects (see also figure 5-7). Appendix H can be consulted to see how the process fits Ultimaker.

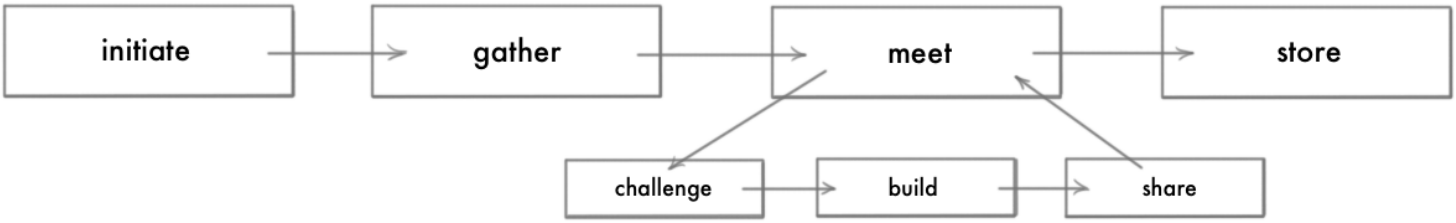


Figure 5-7. Ultimaker meeting process

5.8. Concept selection

In the 'define' phase evaluation criteria were formulated. These criteria are used in a Harris Profile (Roozenburg & Eekels, 1998) to make a concept selection. The Harris Profile is used as a visual aid. The concept Battlefield is perceived to address the criteria best. Explanations of the criteria can be found in appendix M. Therefore the project continues the development of this concept.

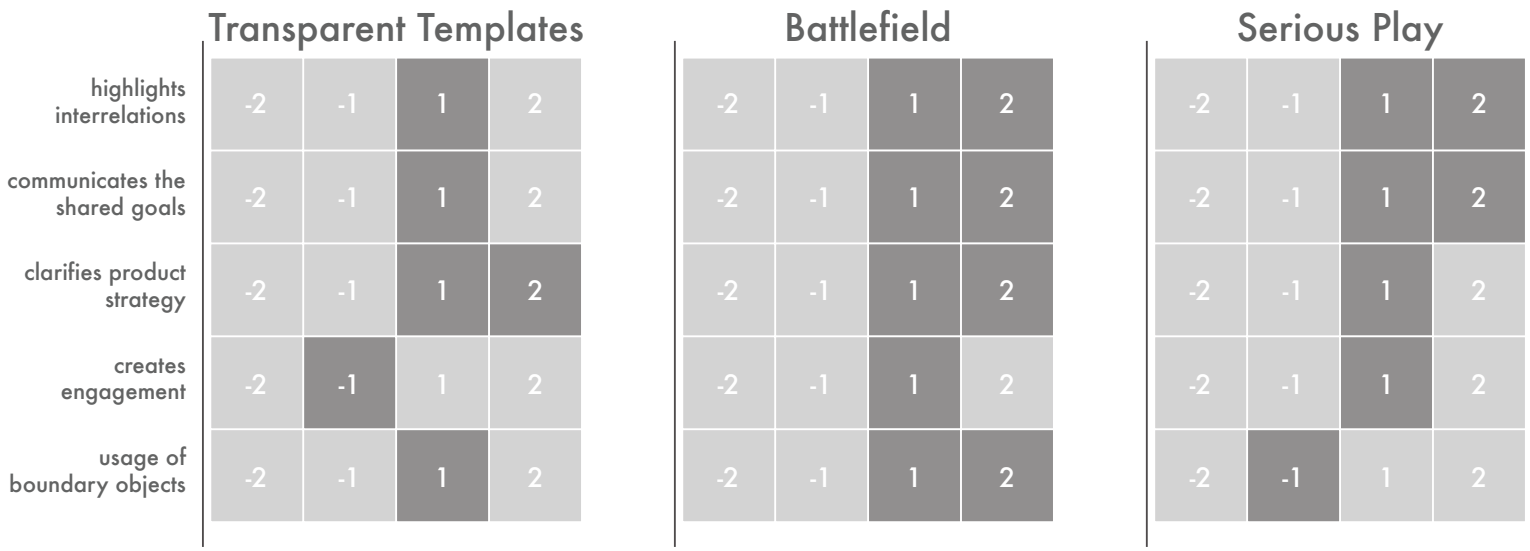


Figure 5-8. Harris Profile

5.9. Concluding the ideation chapter

The choice for the Battlefield concept is the conclusion of the ideation chapter. Various methods were deployed to generate ideas, main ones being How Tos, Inspiring Stories, and Expert Recommendations. The ideation resulted in six preliminary ideas out of which three concepts were picked. The concepts highlight the product strategy and alignment on the topic based on the creation of systems models. The creation of systems models follow the process defined earlier (see figure 4-3) clearly. In addition to the concepts, hygiene factors were defined. The hygiene factors include responsibilities surrounding the concepts and rules the participants and facilitator need to follow. Based on the evaluative criteria, drafted in the 'define' phase, the concepts were weighed and the final concept was selected. In the next chapter this concept will be tested and evaluated to iterate a final concept.

6. ITERATION

6.1. Introduction

The iteration chapter concerns the evaluation of the selected concept. First, a test setup is discussed in which a matrix is presented. Following the setup the experiments are conducted and evaluated. Based on the observations, insights are produced that lead to recommended improvements for the final concept.

6.2. Test setup

Identifying risk factors

Evaluating concept Battlefield requires a focus. Especially risks need to be examined. The risks for the concept are:

- the template
- the building blocks
- the process

Templates represent categorizations such as the Business Model Canvas and other strategy tools mentioned on page 22. It is unknown which structures Ultimaker uses. Furthermore, the actual use of the templates in systems modeling activities isn't been confirmed to be beneficial yet.

The building blocks are new elements that need to be developed based on the product strategy topics most used during meetings. By attending multiple meetings a list of such topics was created (see also appendix L). However, it is still unknown whether the topics are complete and if they would form meaningful building blocks.

Finally, the process that was defined in figure 5-7 guides the meetings. The process was chosen to be ideal for the creation of systems models and connecting to the way meetings were structured currently. It is unknown if this process actually fits Ultimaker practices and is successful in creating the systems models.

Based on the evaluation of each of the major risk points the building blocks are deemed to be a priority in testing the concept. The template and process are found to be sufficiently grounded in literature, whereas the building blocks are least explored and most sensitive to company influences.

Exploring building block parameter

In defining the building blocks a choice had to be made concerning the level of detail to apply. It was found that the level of abstraction needed to be accounted for. Therefore a scale of building block abstraction was created that is used in the tests to determine which is more suitable for

the creation of systems models in pursuit of alignment among employees on product strategy (see also figure 6-1).

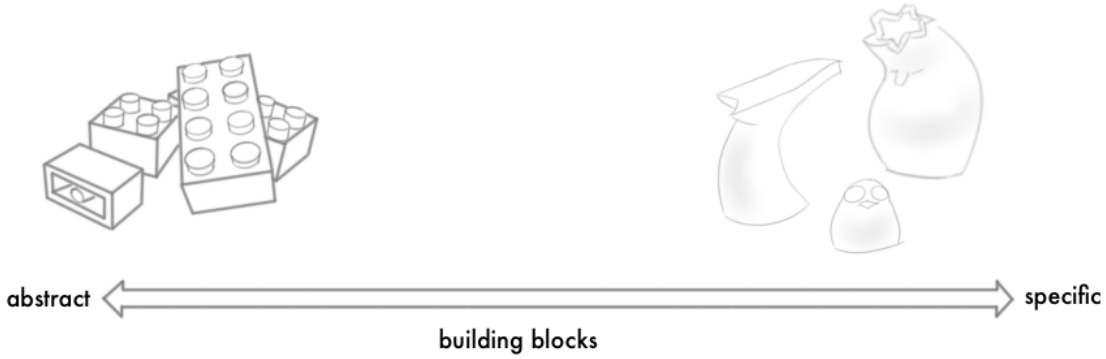


Figure 6-1. Building block abstraction

However, product strategy consists of both the nodes and the links. In the concepts these were represented by the building blocks and structured template. To see if there is a connection between the building blocks and the template, they needed to be tested in combination.

Exploring the structured template parameter
During the configuration of the structured template it was found that the level of guidance is, just like the building block abstraction, a parameter that can't be ignored. Therefore a scale is created that reflects the level of guidance the structure can provide to the discussion of systems models (see also figure 6-2).

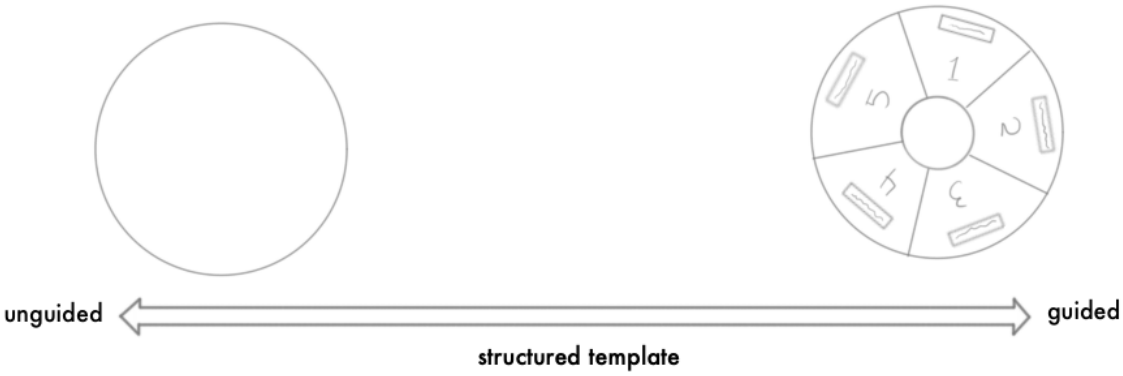


Figure 6-2. Building block abstraction

Joining the building blocks and structured template parameters
In unison the two parameters create a matrix with four areas (see also figure 6-3). In figure 6-3 two tests are identified. It was impossible to test all four areas of the matrix due to the limited amount of meetings available. In the figure the two tested areas are numbered. These areas were chosen to balance the level of detail from both the building blocks and the structured template. Otherwise, if the other two areas were tested, the experiments would seem too contrasting.

Therefore the goal of the tests is to determine how well the building blocks function to define product strategy and how well the structured template guide the meeting. See also appendix J for supplementary documents on the preparation.

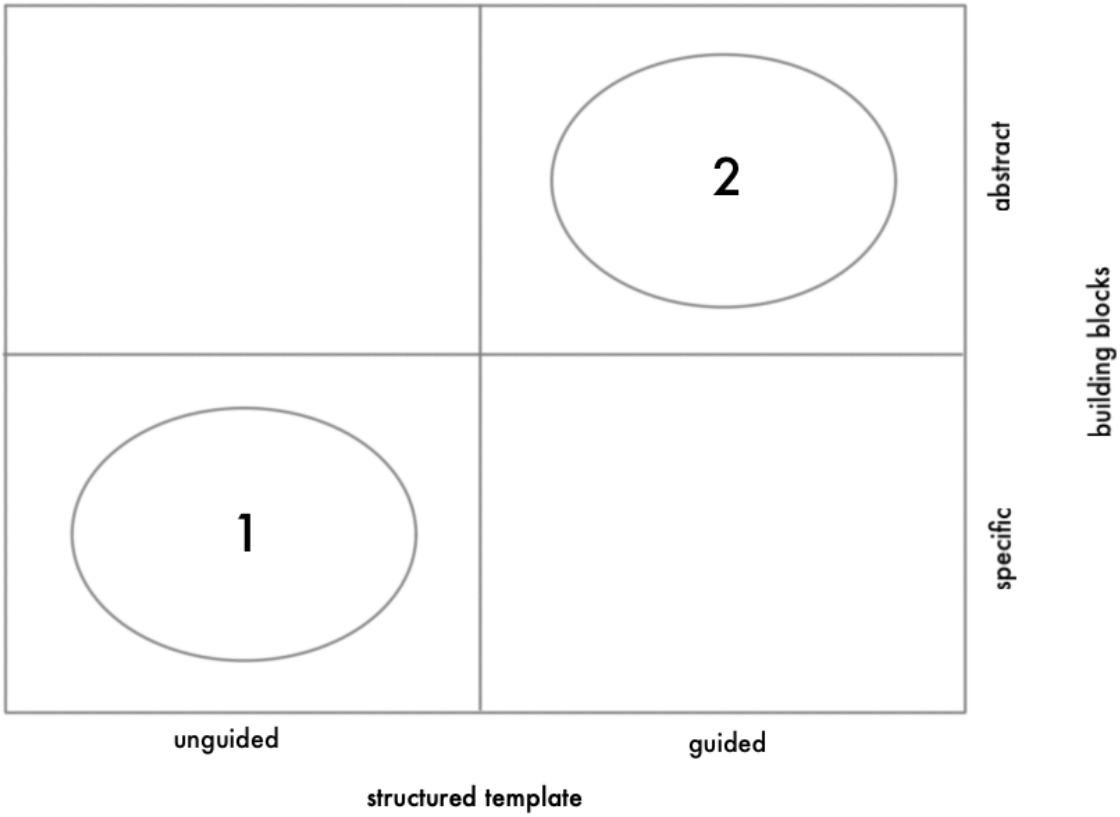


Figure 6-3. Test matrix

6.3. Conducting the experiments

The tests are described containing the course of the experiment and observations. These can be used in the next paragraph to create improvements for the final concept.

Test 1: unguided template + specific building blocks
Test 1 was held during a meeting concerning the vision of the software and services roadmap of Ultimaker. Led by the members of the Product Management department, a proposal for the software and services roadmap was presented. The Product Management participants wanted to inform the other stakeholders of the result of their roadmapping activities and to acquire feedback on the roadmap from the other stakeholders. After the presentation of the roadmap and the process behind it, it was time for discussions about the content. For this purpose the specific building blocks were used existing out of wooden disks. The participants used the building blocks to copy parts of the roadmap. Consequently they were able to move the different parts and create new perspectives and insights (see also figure 6-4).

During the meeting some observations were made:

- people started to add extra writing to the building blocks
- post its were used to elaborate on the topic
- posters diverted attention from the systems model
- some people used the blocks to highlight items on the posters
- people took some time to find the right building blocks
- people mentioned that some of the blocks were not completely clear
- the building blocks triggered people to start talking about represented topics
- some building blocks were used multiple times, while others were not used at all
- participants wandered through the meeting room

Figure 6-4. Test 1: unguided template + specific building blocks

Test 2: guided template + abstract building blocks

Test 2 was initiated to explore what the Ultimaker vision and possibilities could be regarding webinars. This meeting was better able to follow the prescribed process as this was led by the researcher. The meeting was divided in two parts: a individual build part and a collective build part. In the individual build part each participant created their own interpretation of the future of webinars by Ultimaker using LEGO blocks. After sharing their models, they started to collectively develop a model fitting in the structured template. During the building of the collective model, the participants discussed a lot with each other. However, the focus was maintained by the representations of the physical objects.

During the meeting some observations were made:

- people were walking around the table in search of the appropriate LEGO blocks
- Now and then it took some time to find the right pieces
- some people did not start right away at the start of a building phase and seemed to look at what others were doing
- people mentioned that is is hard to save the meaning of the LEGO blocks for people who did not attend the meeting
- the structured template created a good starting point for discussions
- the structured template provided a beneficial overview of the different objects
- the use of LEGO blocks required the participants to think in metaphors
- the table got cluttered with LEGO blocks

Figure 6-5. Test 2: guided template + abstract building blocks

6.4. Improvements

During the test attention was being paid to how well the specific and abstract building blocks could support the discussions between people and create systems models of the project or strategy context. From the tests it was found that a middleground needed to be found between modular blocks and pre-defined shapes. The structured templates were found to be beneficial for the process of the meeting.

Improvements are listed here:

- enable extra information to be added by providing writing spaces
- more distinct strategy component shapes need to be developed, as well as neutral shapes, which can be connected
- designated spots on the meeting table are needed to gather the unused building blocks

One improvement is that the concept should enable the addition of information to the building blocks. Observed in both meetings was the fact that people used markers and post-its to add more information in an attempt to clarify the building blocks. This can be done by providing writing spaces on the building blocks.

The modularity of the LEGO blocks was well appreciated, but created too abstract models. The disks were valued for their clarity in large systems, but lacked detail and contrast. Therefore a middle ground needs to be found between modularity and meaning. Therefore more contrasting

shapes of the strategy components need to be produced which can be joined. Besides the strategy components, neutral building blocks need to be present to allow for new shapes to be created.

To avoid the unnecessary building blocks from cluttering the meeting room, designated spots are needed where the unused building blocks are gathered. By creating pockets in the tabel the building blocks are neatly stowed away.

"THE TESTS RESULTED IN OBSERVATIONS THAT LED TO THREE IMPROVEMENTS FOR THE FINAL CONCEPT"

6.5. Concluding the iteration chapter

In the iteration chapter main risks to the concept are identified. A test plan was executed to determine two factors of the concept: the building blocks and the structured template. For both factors a scale was set based on a main characteristic. Based on a matrix, that combines the two factors, two tests were prepared. The tests resulted in observations that led to three improvements for the final concept: added writing spaces for extra information, distinct product strategy component shapes as well as neutral shapes, and stowing spaces on the table were the shapes can be housed. These improvements are being integrated in the final concept described in the next chapter.

DELIVER

The deliver phase is used to finalize the project. The final concept is presented and a plan to implement it is proposed. This phase synthesizes the result of the previous phases in a logical story.

7. FINAL CONCEPT

7.1. Introduction

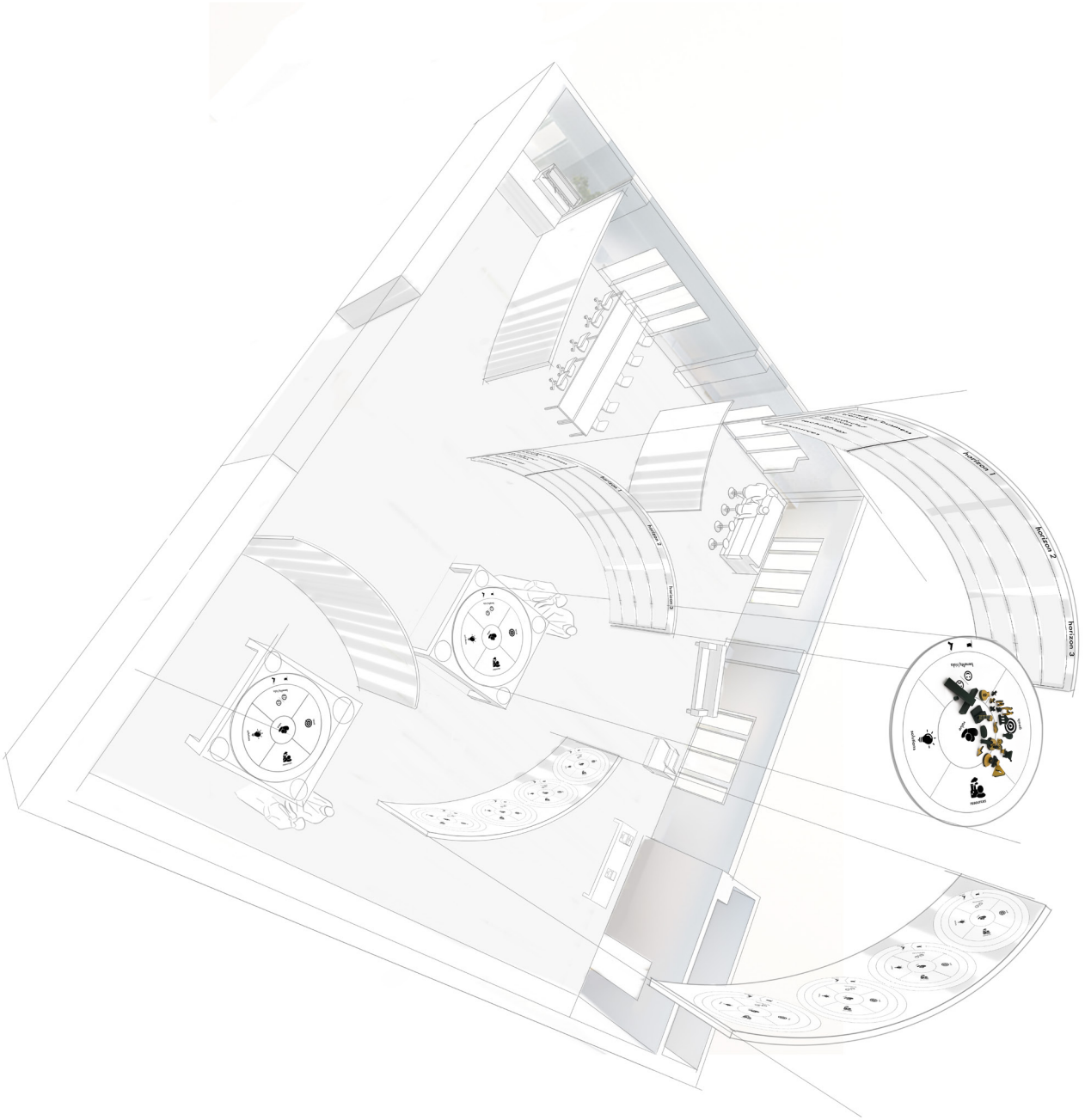
Based on the knowledge obtained in the previous chapters, the final concept can be presented (see also figure 7-2). With the improvements processed, the concept is elaborated on part by part. An overview of the final concept is provided, followed by a scenario. After that a roadmap explains what steps can be taken to keep the concept evolving over time. Finally the implementation of the concept is discussed.

7.2. The idea

The idea is to institute a physical, systems modeling process within the War room at Ultimaker. Employees dealing with product strategy are guided through a meeting in which they will use developed building blocks to fill a template. The building blocks represent product strategy components and the template structures the building blocks.

Figure 7-1. Final concept

Figure 7-2. Final concept



The building blocks in combination with the template create systems models that provide overviews of individual projects. These systems models connect to the other materials in the War room such as the roadmaps on which the projects are indicated and to the vision posters that reflect the same values. This enables product strategy stakeholders to align on the product strategy.

This idea addresses the problems identified in the discover phase: ambiguous information, complex information, and top-down communication.

The building blocks are not completely specified, forcing the participants to define their own meaning. Over time this should lead to a company-wide jargon.

The physical systems models force participants to simplify the projects because of limited building blocks that represent product strategy components and templates that structure the product strategy content.

The process in which the systems models are constructed and discussed creates engagement from all participants. The building blocks encourage people to play with different compositions.

War room overview
The final concept is a method that can be used in meetings in which participants discuss product strategy through physical tools and communicate their findings to others in the company. The method consists of the following aspects which will be discussed more in depth:

- the process
- the template
- the building blocks
- the War room
- the War room manager
- the facilitator

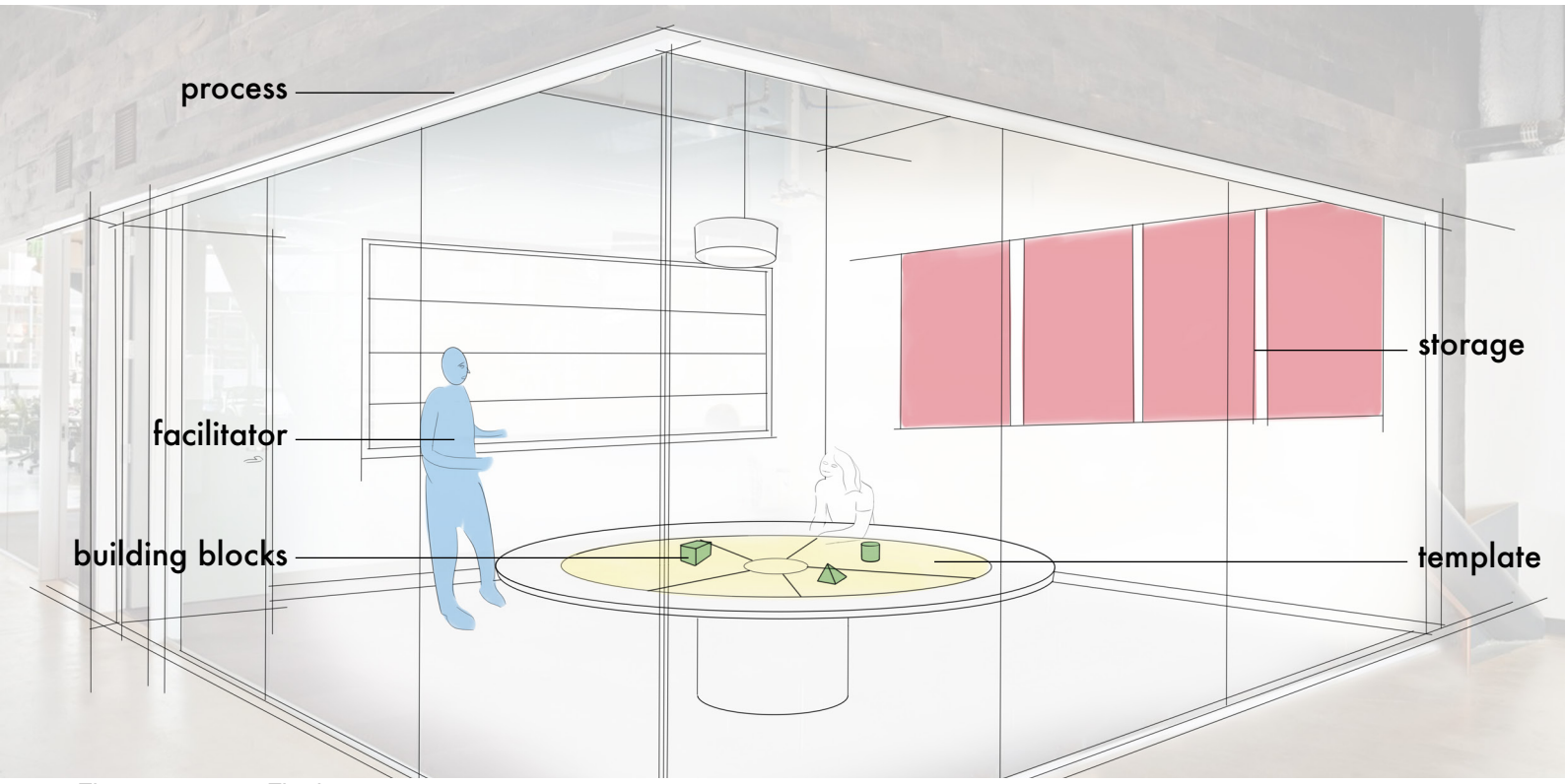


Figure 7-3. Final concept

Process
Setting up the physical systems modeling process a sequence of activities as seen in figure 7-5 is used. This process facilitates the meetings which take place in between product management and the project teams (figure 7-4).

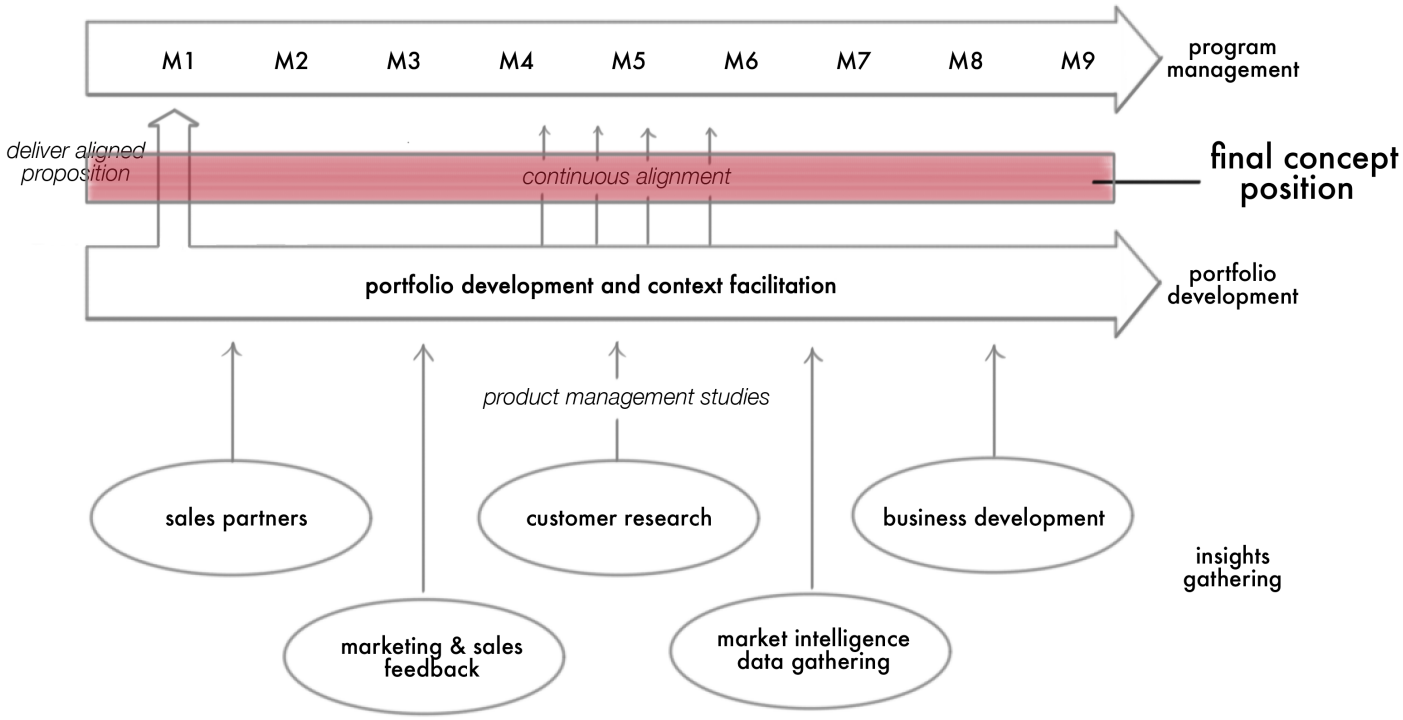


Figure 7-4. The final concept's position in Ultimaker's context

The section that is highlighted in red in figure 7-4 is where the War room comes in. For employees to align, the War room helps out in providing an overview of the current projects and facilitating a discussing on the composition of the projects.

The discussion in mind are the meetings in regard to product strategy. The meetings follow a fixed process in order to solve the problems. That process is displayed in figure 7-5.

Figure 7-5 shows a meeting which initiated to discuss new information or update each other on product strategy. The key stakeholders, often being product managers and project leaders, are gathered and the meeting begins. In the meeting the goal or challenge, is discussed. Based on the goal or challenge, participants are requested to build their answer using the building blocks. When built, the participants share their information and colaborate to create an final overview of the system. At the end of the meeting the result is stored in the War room, making it accessible to others and enabling the project leads to disseminate the model.

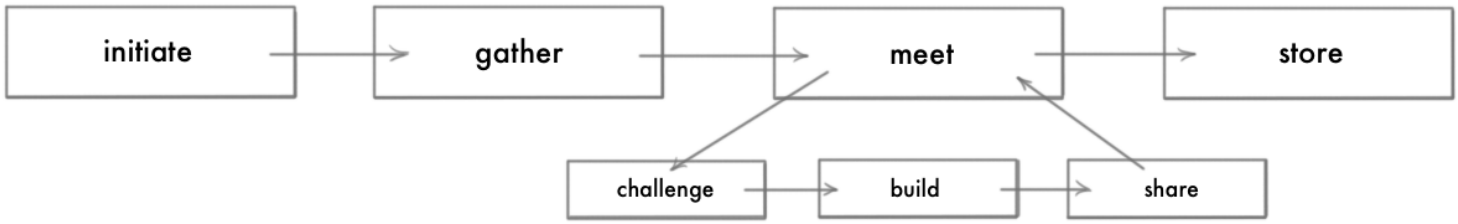


Figure 7-5. Concept process

Template
The template provides a structured approach to systems model creation. The template is made of magnetic whiteboard material with a printed structure on it, dividing the board in sections and allowing to be drawn on.

With the template a shared understanding of a project can be created. Therefore a structure has been found to create a consistent picture of each project. To do so, current structures were analysed and an estimation was made on how well they would describe projects at Ultimaker. After iterating on the project templates, which are based on existing structures, expert insights, and company analysis, a final template emerged (see also appendix F) which is displayed in figure 7-6.

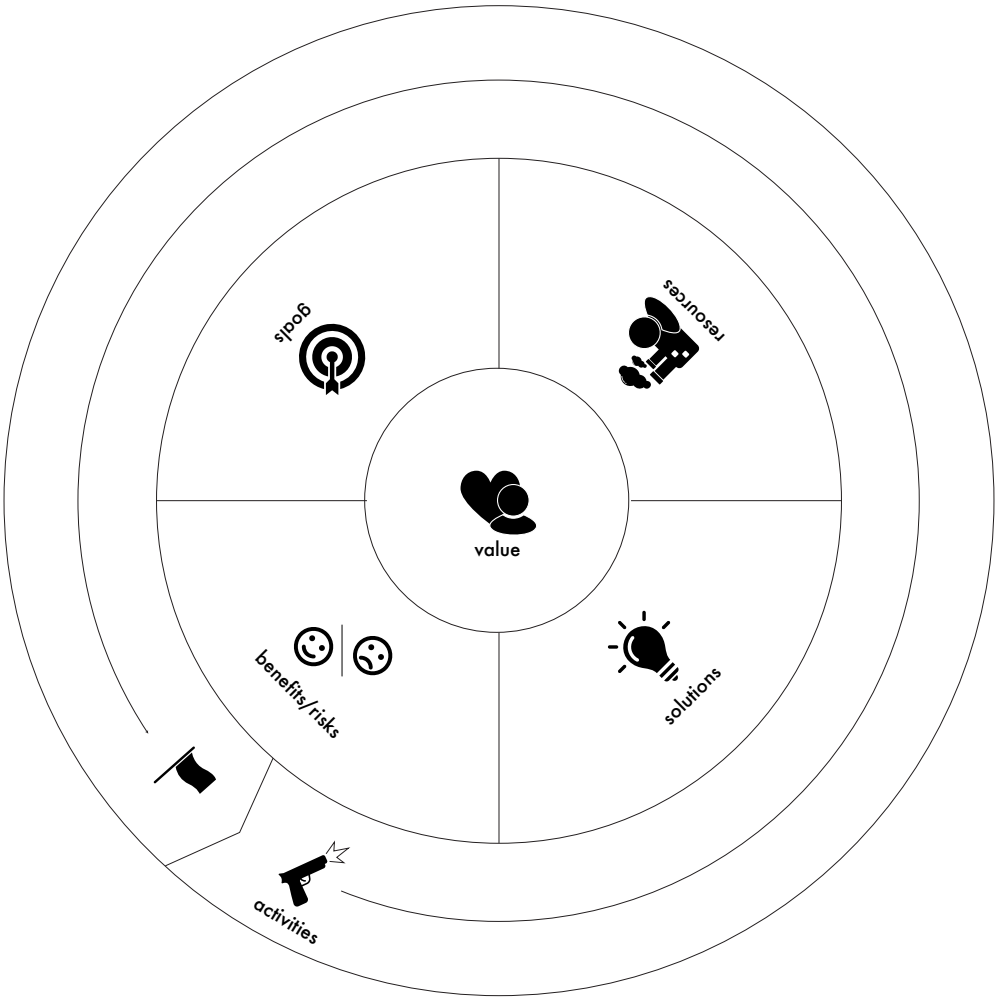


Figure 7-6. Concept process

"THE BUILDING BLOCKS ARE ITEMS REPRESENTING PRODUCT STRATEGY COMPONENTS"

The template is divided into six different parts: value, goals, solutions, benefits/risks, resources, and activities. By providing each part with content an overview of a project can be created. The order in which the topics are discussed can change and will switch back and forth. However, it is advised to start with the value, because the company strives for a human-centered approach.

The value area focusses on the problem you want to solve for the customer. The value you want to offer is the problem you solve. You want to take away a pain or jump into an opportunity.

The goals describes the desired results or aims. A project's value proposition can be evaluated based on the goals set at the beginning of the project.

The solutions are ways in which you can reach the goals. Multiple solutions can be explored during a project.

With each solution there are benefits and risks involved. Exploring these can indicate whether the solution is viable.

Building blocks
The building blocks are items representing product strategy components. In combination with the template they create systems models.

Based on the tests executed in chapter six a set of building blocks should (figure 7-7):

- contain building blocks product strategy meaning
- contain building blocks without meaning
- connect to the template
- connect to each other
- allow to be written on

Therefore the building blocks are made of magnetic whiteboard icons. The set of building blocks has been iterated on and resulted in the following objects:

action, priority, user, employee, insight, happy, unhappy, value, idea, offer/service, goal, money, agreement/partner, thought, dialogue, printer, market, benefit, drawback, time, and department/institution (figure 7-6).

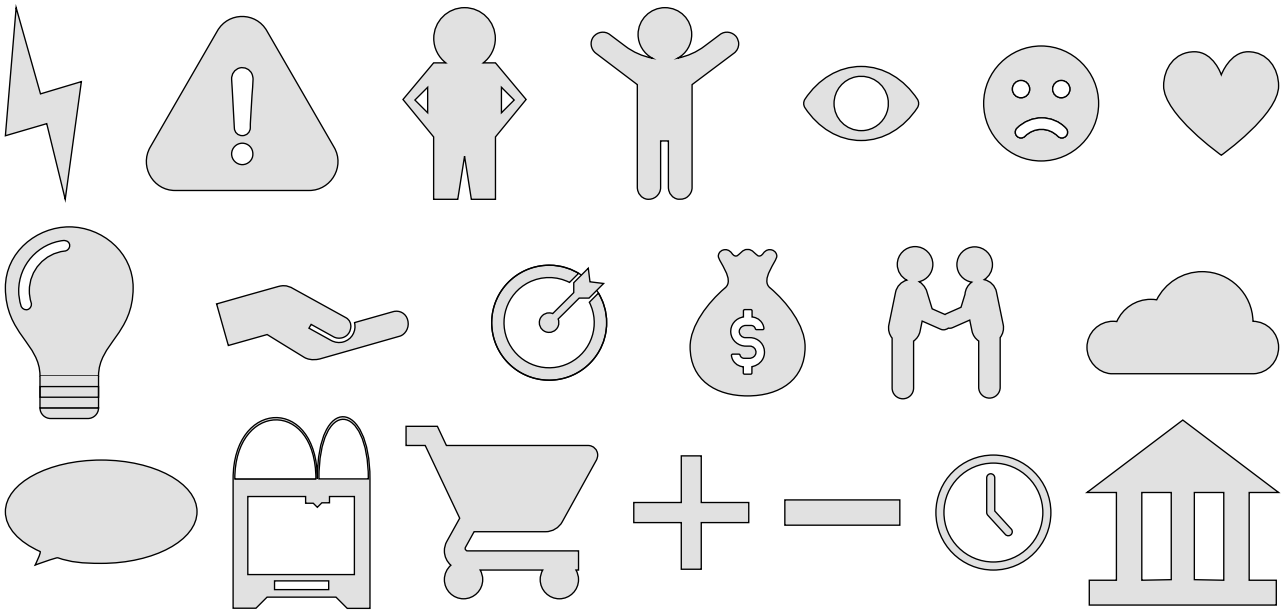


Figure 7-7. Roadmap illustrating several steps towards product evolvement

War room
The storing of the systems models enables the sharing of product strategy throughout the company. The systems models are kept in the War room where employees can easily access the information (see also figure 7-8). It is the job of the strategy translators to explain the generated content to the dispersed teams.

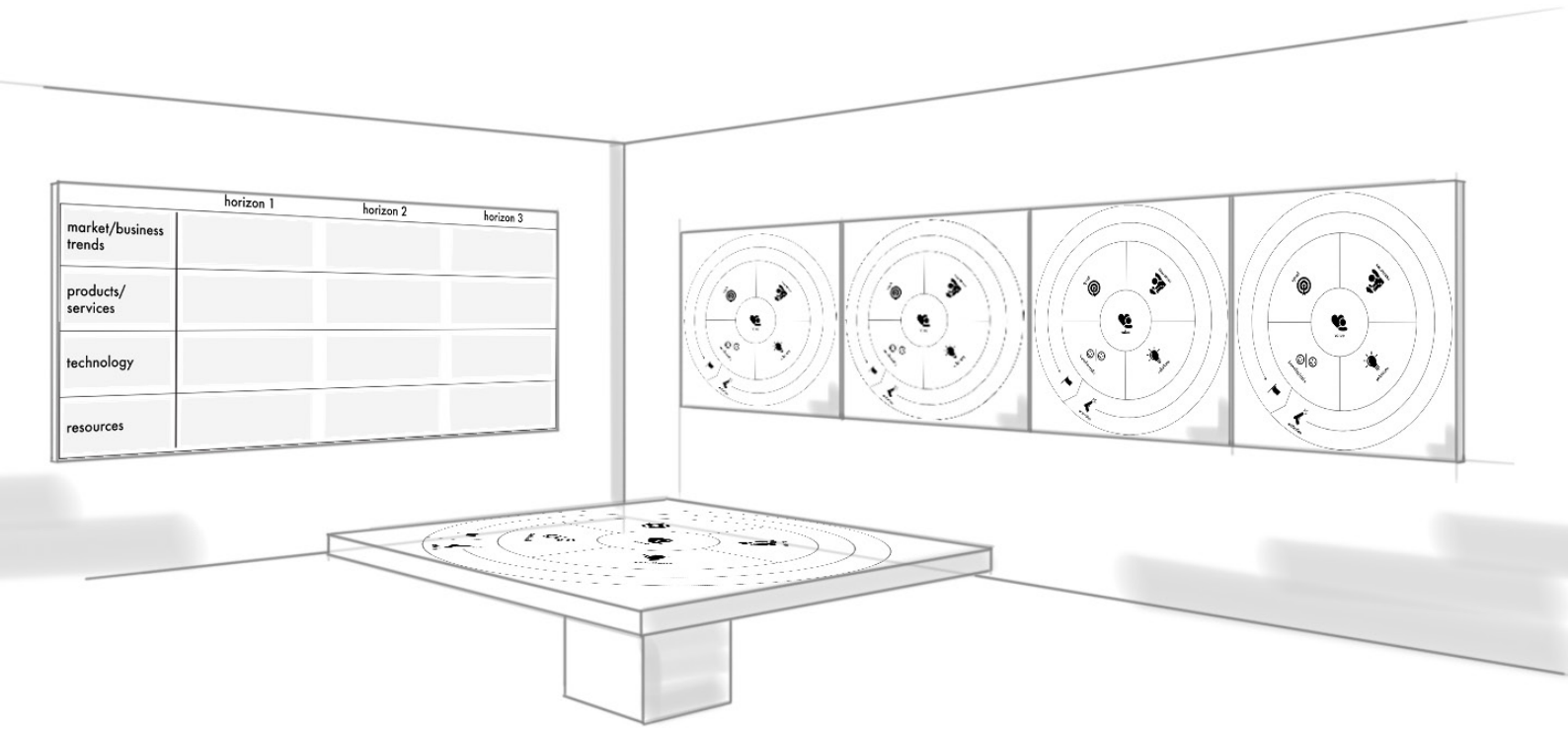


Figure 7-8. War room layout

War room manager
The War room manager's tasks are most prominent in the implementation of the project. He needs to decorate the room, develop the templates and building blocks, and act as an ambassador. That last task might be the most difficult, because he has to convince people of the concept's value. To do so he has to explain how the concept should be used because it requires some skill building.

Facilitator
The facilitator is the person who leads the meeting. This is often a product manager or project leader. The facilitator is responsible for maintaining the etiquette formulated in the ideation chapter (see 5.7). The facilitator of the meeting is not the same person as the War room manager.

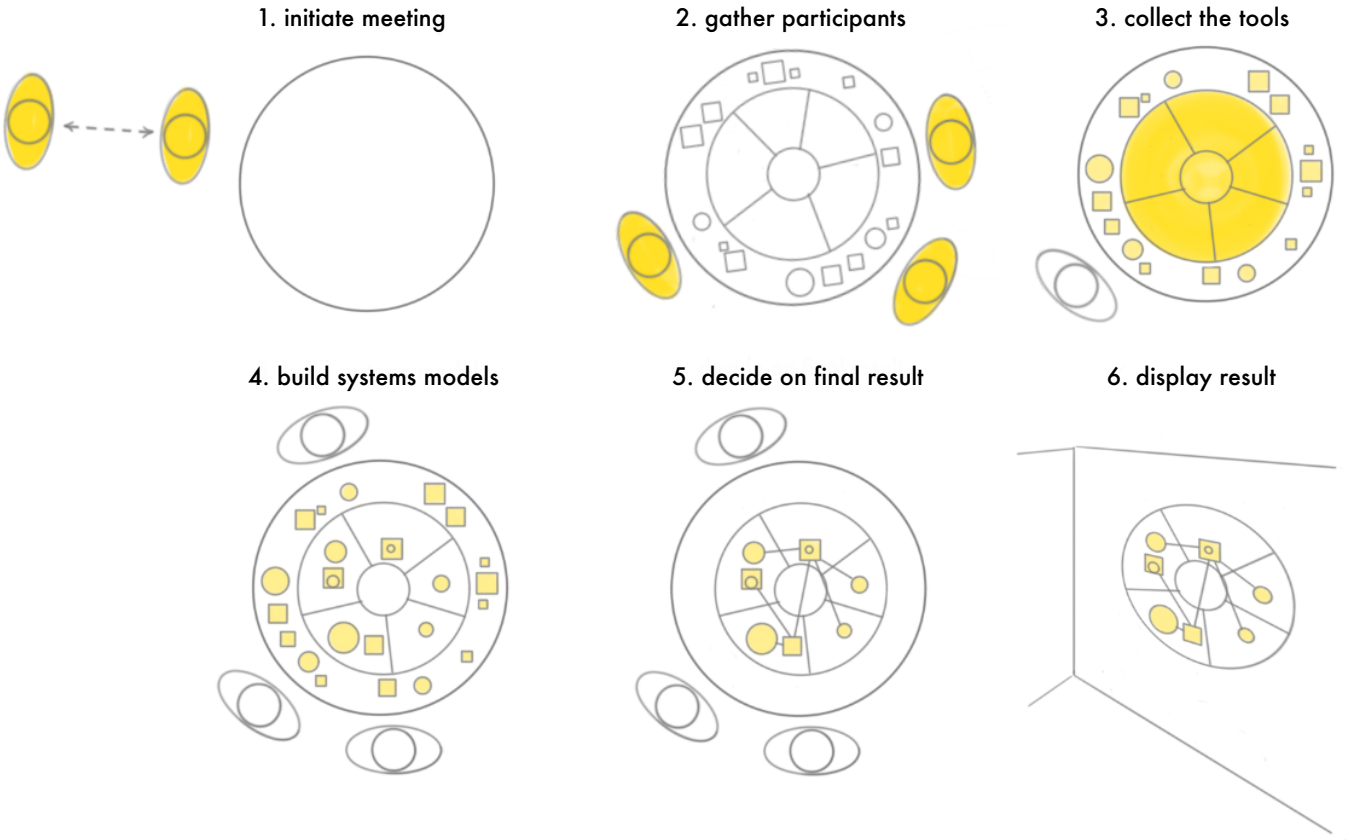


Figure 7-9. Scenario of the final concept

Scenario
In aligning the different stakeholders, a stepwise process is depicted in figure 7-9.

1. initiate meeting
The meeting is initiated by a person responsible for the execution of a part of the product strategy, a product manager or project leader, who will be the facilitator of the meeting. That person consults the War room manager to define the goal of the meeting.

2. gather participants
The facilitator invites participants to join the meeting.

3. Collect the template and building blocks
If a new project is initiated a new template is made, otherwise the project's template the meeting is concerned with is collected. The facilitator checks if enough building blocks are present.

4. build systems model
The meeting is started by discussing a certain area on the canvas appropriate to the meeting's goal. Partipants are supposed to use the building blocks to express their ideas or concerns. Discussions revolve around the realization of systems models that are formed using the building blocks and template.

5. decide on final result
At the end of the meeting, the systems model is fixed. The systems models result in an overview of a project; its risks, action points, benefits, and other strategy components.

6. display result
The resulting systems model is displayed on the wall in the War room. Stakeholders can revisit the model and understand its intricacies. The model can be continued or reused in future meetings.

7.3. Horizons

Aligning departments on product strategy is not achieved in a single moment. It is an ongoing process that requires continuous effort. Therefore attention should be paid to how the project will evolve over time. A concise roadmap is displayed in figure 7-10. In the figure the most important connections are highlighted as well.

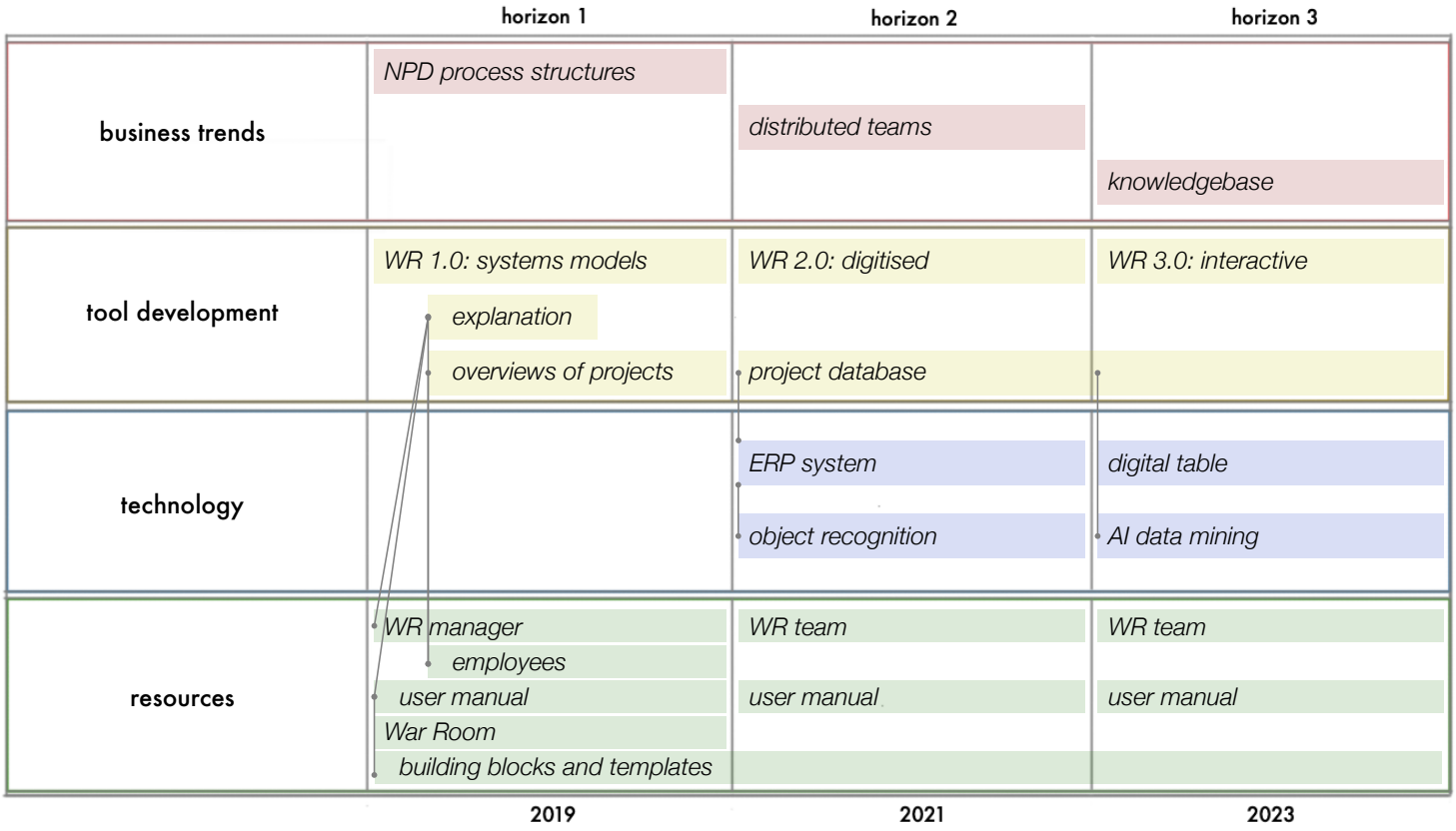


Figure 7-10. Roadmap illustrating several steps towards product evolvement

The roadmap of the tool is split into three parts, also known as horizons. The first horizon reflects the implementation of the minimum viable product. The second horizon includes the digitization of the tool. Finally, the third part includes a brand new interacton quality to the tool by embedding a smart system with which users can interact with.

First: minimal viable product
The War room's purpose is to connect to Ultimaker's efforts to institute more internal structures. Therefore the first horizon's main goal is the kick-off of the tool. Before the tool can be launched a War room manager needs to be appointed to develop the template and building blocks. Besides, the interior of the War room's needs to be arranged.

A parallel responsibility is to gain buy-in from people within the company. Without the support of the employees the systems models will never be used. The War room manager has to train the teams to make optimal use of the concept and ensure its durability. Therefore special attention should be paid to the fidelity of the concept's components.

Second: digitized systems models
The second horizon introduces a functional improvement of the concept. The digitization of systems models should improve the alignment between different locations. Although Ultimaker is already expanding to other parts of the world, it is envisioned that communication between those locations becomes more important in a near future. Nowadays most of the work is executed in the headquarters, but over-time, as the offices abroad take on more work, distributed teams will appear.

By that time an online ERP system will be modified to include the systems models by recognizing positions of building blocks. It is helpful to have built up some experience with the systems models first, before the decision is made to spend many resources in developing a digital system.

It should be noted that the digitization functions as an expansion of the concept. It does not change the way it works.

Third: interactive system
The final horizon depicts a far future vision in which an interactive system replaces the concept. This interactive system makes use of a database of systems models created the previous horizon to provide users with feedback.

An interactive screen can be used to place building blocks on. The system can provide more contextual information based on the building blocks used and their arrangement on the screen. It could show relations to other projects, give advice on how to approach certain elements, and connect participants to relevant people.

For the development of this system a lot of resources are needed, as the interactive system requires a lot of maintenance.

7.4. Implementation

The horizons already explain most of what needs to be done in order to rollout this concept. Here an overview of the necessary steps are described and an estimation of costs.

Steps
1. *appoint War room manager*
2. *test and iterate the concept with employees*
3. *create company commitment*
4. *arrange the War room*
5. *generate first content*

7.5. Validation of the concept

"PARTICIPANTS WERE ASKED TO CREATE A SYSTEMS MODEL OF A PROJECT"

Although research is still needed, a first validation test was conducted at the company. The tests focused on the manner in which employees work together on creating a systems model of a self-chosen project and if their systems model was understandable to other employees. A prototype was built to support the tests (see also appendix K).

Research question

- Do physical systems models describe projects insightfully?
- Do physical systems models contribute to the communication of project information?
- Do physical systems models create alignment?

Execution

Three tests were conducted with employees from product management. Each test included three participants. During the tests the participants were asked to create a systems model of a project they work on and to communicate this to another participant.

At first two participants were gathered and asked to create an overview of their project using the template and building blocks. They were free to discuss and use as much time as they wanted. After completion of the systems model a third participant was asked into the room to whom the first particpants explained the systems model. Based on that story the third person was asked to reproduce the story. Measurements depended on the amount of systems model components the third person got right.

Results

Results from the tests are collected in the lists below.

The first test:

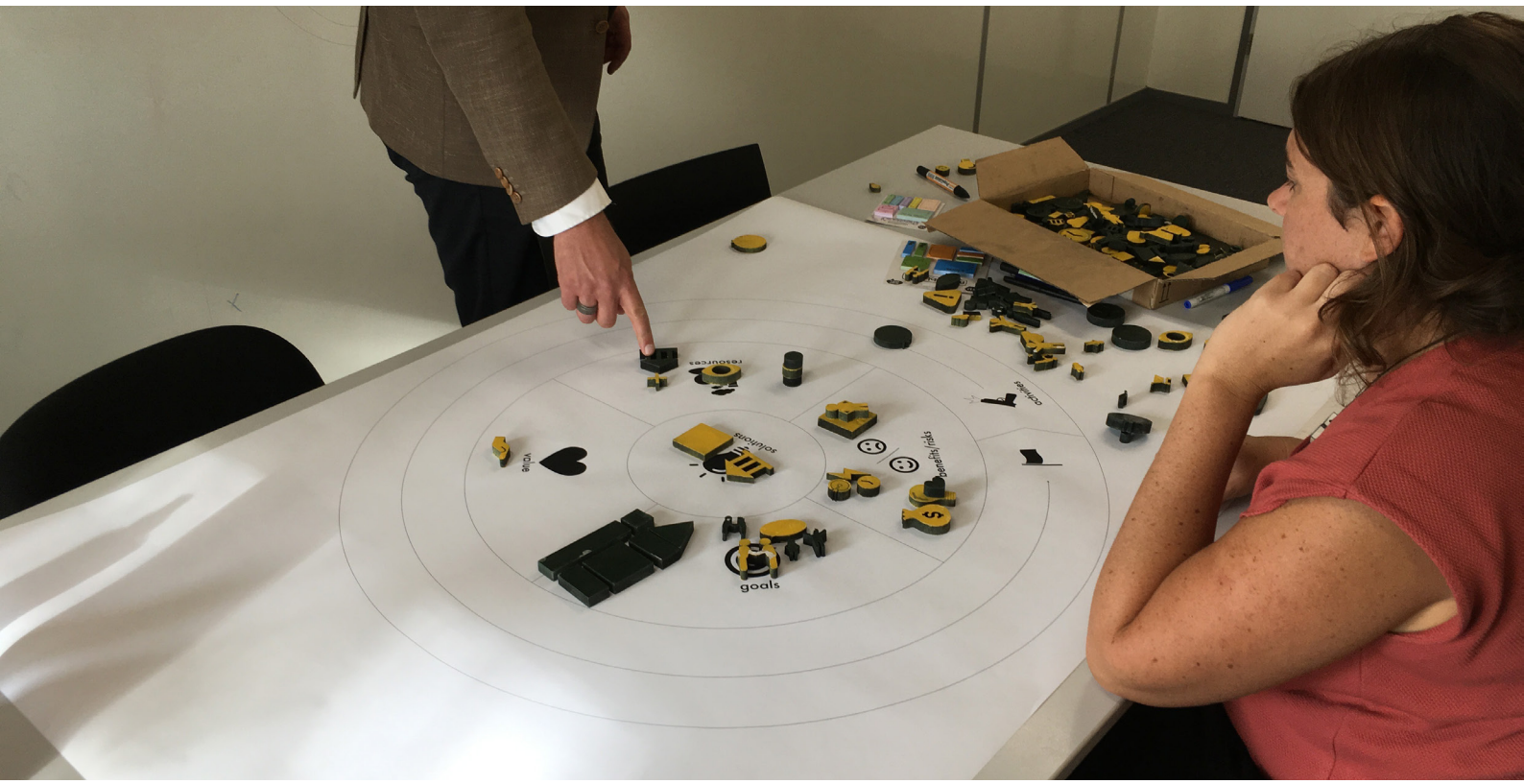


Figure 7-11. First validation test

"BY USING DIFFERENT BLOCKS THEY DISCUSSED THE ESSENCE OF EACH ASPECT OF THE SYSTEMS MODEL"

Positive

- the building blocks are the things that I usually draw
- the template and building blocks make you think about the different aspects
- it does create collaboration
- the building blocks transfer metaphorical information
- the template and building blocks form a framework

To improve

- the concept still makes it hard to create storytelling of really complex systems
- watch out for the level of fidelity

The first test went smoothly. The participants seemed eager to explore how the concept worked and started building right away. Intuitively the participants started at one area on the template and moved on to others. By using different blocks they discussed the essence of each aspect of the systems model.

The second test:

Figure 7-12. Second validation test

Positive

- it is nice to grasp an overview of the project
- it is already clear without an explanation

To improve

- participants would like to explain more things
- the building blocks deter some people from using them
- like to include where the revenue came from
- very vague

The participants in the second test were much more hesitant and insecure to use the building blocks than the first group. The second group preferred to keep to their own ways by writing most things on the small Post-its. Therefore more help from the facilitator was needed to come to a complete systems model.

The third test:

"THE SECOND GROUP PREFERRED TO KEEP TO THEIR OWN WAYS BY WRITING MOST THINGS ON THE SMALL POST-ITS"

Figure 7-13. Third validation test

"PARTICIPANTS HAD A SHARED UNDERSTANDING OF THE PROJECT"

Positive

- forces to create a sharp, clear story
- structures information
- great to discuss the main story of a project
- creates visuals that support understanding
- invites people to be creative

To improve

- it might make systems to simplistic
- an accompanying story might be needed to fully understand systems model

The participants in the third test were quite cheerful. They seemed to have a lot of fun while playing with the building blocks. They didn't add any keywords to the building blocks which made them hard to interpret.

Concluding
The validation tests conclude that the concept still needs some development, but that the direction is a desired one to create alignment on product strategy. The participants mentioned that the concept makes them consider the different aspects in a structured way. Gathered feedback also found that collaboration was enhanced and that it created clarity. Finally, alignment was created because the participants had a shared understanding of the project which was physically represented.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. Introduction

The conclusion of this thesis contains a reflection on the design goal of the project, as well as a discussion and recommendations. With this final chapter the project is finalized.

8.2. Conclusion

To conclude this project we have to refer to the original goal of the project in order to evaluate whether the project has been successful. In the original goal a question was posed as to how a room could be used to create alignment on product strategy.

In answer to the goal, a solution was developed that proposes a physical systems modeling method. A war room is equipped with project templates and building blocks that enable employees to collectively build tangible project compositions. The compositions provide a viewer with an overview of the project which leads to better alignment on product strategy.

In the development of the solution, several criteria were found to be essential. Most important criteria were the highlighting of interrelations, the communication of shared goals, the clarity of product strategy, the creation of engagement, and the effective usage of boundary objects.

It can be concluded from tests that the solution supports the creation of project overviews, but that time is needed to determine whether this also increases alignment. The project has been well received and tests indicated its potential.

8.3. Discussion

Although the proposal seems promising, some aspects are still unclear.

The scoping of the project towards the tools and activities meant that other aspects were not attended too. Therefore it is unsure how the solution would operate in the total setting of the war room. Future tests should indicate whether the solution coheres with the company context. A case could be made that other processes should be shaped to sustain the systems modeling method, since it is supposed to play a central role.

The project focused a lot on feedback from the employees. Many employees were involved, although not all departments are represented in the work. This inevitably leads to a generalisation of values that may not reflect the entire company.

Further focus has been applied to high level product strategy, thereby limiting the kinds of meetings supported by the tool. Aspects such as the technology roadmap and meetings concerning detailed engineering topics are not suitable to be discussed using the tool. However, other templates and sets of building blocks can be developed to address other kinds of meetings within the company. The value of developing other uses should be evaluated before such expansions are being developed.

The creation of the systems models is dependent on the users of the tool. The facilitators should ensure a clear overview is produced, but there is no guarantee this will actually be achieved. Influencing the result of the systems modeling activity are the facilitators abilities, the ambiguity of the building blocks and the layout of the template.

Understanding the systems models requires interpretation of the building blocks and their composition. Although the goal is to fix the meaning of the building blocks, they are still open to interpretation. Habituation should create a shared language over time, but it remains unsure whether this will actually be the case at Ultimaker.

That leads to another topic, which is the creation of support among employees. To ensure that the tool is accepted, it has to prove its worth. However, it is hard to quantify alignment and therefore the value of the tool. Although it might have subjective advantages, such as better decision-making, clear awareness of the project's context, and creating shared understanding, people have different interpretations of these.

To sustain the tool over time, a war room manager should address the topics of creating support among employees, adjusting the building blocks to the users' needs, and the value of the tool.

A final aspect to discuss is how company specific the solution is, or if it can be implemented in other companies, too. Although the tool is quite generic, specific Ultimaker elements are added to the building blocks that are not as useful to other companies. Besides this, the solution fits Ultimaker's context. Companies operating in the same way could indeed copy the solution and implement it themselves, but it is unlikely that they handle product strategy in the same way.

8.4. Recommendations

Recommendations are proposed to solve concerns voiced in the discussion. In the discussion the following issues were identified:

- scoping excludes holistic view
- not involving all stakeholders
- only applicable to high level strategy
- unsurety about achieving clear project overviews
- concern about development of shared language
- difficult to measure alignment
- unsurety about durability
- unsure how to prevent imitability

The execution of pilots remains one of the most important continuations of Project War Room. The tests should result in the tuning of the tool to other aspects of the war room.

The involvement of all parts of company is a task for the war room manager. Creating support for the tool from all parts of the company is necessary to generate alignment across the different departments.

Although the tool as-is only applies to high level product strategy, expansions can be developed to serve other purposes as well. It is recommended to adjust the blocks and template for conversation purposes in order to make people familiar with the process and discover other opportunities to apply the underlying ideas of physical communication.

Creating desired overviews can be difficult. Therefore people have to be instructed on how to use the tool by the war room manager. Doing so also creates more support for the tool.

The training also creates familiarity with the tool among employees. This can be used to develop a shared language. The development of a shared language can also be supported by the creation of a glossary, explaining the building blocks.

Alignment is difficult to measure. To get a sense of the value of the tool, satisfaction tests can be deployed. Besides this, other aspects can be evaluated, such as decision-making, improved collaboration, and cross-contamination.

However, to prevent the degeneration of the tool a war room manager should keep updating the tool and war room in order to keep it relevant. The value of the war room should be evaluated regularly and adjusted if necessary.

Finally, the imitability of the tool is not a major concern. It is impossible to keep other companies from copying the idea. However, the building blocks and template can be developed in such a way that it only makes sense to Ultimaker. An important requirement is the presence of a jargon.

A first step has been taken in the development of the War room by proposing a tool that co-creates product strategy. Then, these results are communicated. However, more tests need to be conducted to improve the template and building blocks and other aspects of the war room as well. Therefore a few recommendations are made to advise on the immediate future.

- appoint a war room manager to detail the concept
- establish a war room in the new office
- contact external facilitators to adopt the tool in the company
- adjust policies to integrate the systems modeling tool in project deliverables

9. REFERENCES

Book

Sanders, E. and Stappers, P.J. (2013). Convivial Toolbox: Generative Research for the Front End of Design. BIS Publishers.

Osterwalder, A. and Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers.

Osterwalder, A., Pigneur, Y., Bernarda, G., and Smith, A. (2014). Value Proposition Design: How to Create Products and Services Customers Want. Wiley.

Simonse, L. (2018). Design Roadmapping. BIS Publishers, Delft.

LEGO Group (2010). LEGO Serious Play; Open Source, Introduction to LEGO Serious Play. LEGO Group.

Sanders, E.B.N. and Stappers, P.J. (2012). Convivial toolbox: generative research for the front end of design. BIS Publishers.

Gauntlett, D. (2018) Making is Connecting: The social power of crafting, from craft and knitting to digital everything. 2nd edition. Polity Press, Cambridge.

Sinek, S. (2009). Start with why: How great leaders inspire everyone to take action. New York, N.Y.: Portfolio.

Weick , K.E. & Roberts, K.H. (1993). Collective Mind in Organizations: Heedful Interrelating on Flight Decks. Administrative Science Quarterly, 38 (3), p.357-381.

Stompff, G. (2012). Facilitating team cognition: How designers mirror what NPD teams do. DOI:10.13140/RG.2.1.4879.5680.

Ulonska, S. (2014). A Knowledge-Based Approach for Integration of System Design Methodology and Documentation in Advanced Multi-Disciplinary NPD Projects. NTNU, 2014:373.

Journal article

Espinosa, J.A., Lerch, J. & Kraut, R.E. (2004). Explicit versus implicit coordination mechanisms and task dependencies: one size does not fit all. In Salas E & Fiore SM (Eds.), Team cognition. Understanding the factors that drive process and performance (pp.107-129), American Psychological Association (USA).

Porter, M. (1996). What is strategy? Harvard Business Review, 74(6), p.61–78.

Hitt, M.A, Ireland, R.D., Sirmon, D.G. and Trahms, C.A. (2011). Strategic Entrepreneurship: Creating Value for Individuals, Organizations, and Society. The Academy of Management Perspectives, 25(2), p.57-75.

Webpage with author

Produx (2016). What is Good Product Strategy? Retrieved from http://www.produxlabs.com/2016/07/14/what-is-good-product-strategy/

Facing the Future (n.d.) Interconnectedness. Retrieved from https://www.facingthefuture.org/pages/interconnectedness

Perri, M. (2016). What is Good Product Strategy? Retrieved from https://melissaperri.com/blog/2016/07/14/what-is-good-product-strategy

Perri, M. (2014). The Build Trap. Retrieved from https://melissaperri.com/blog/2014/08/05/the-build-trap

Riccio, J. (2015). Meeting of minds: How strategic partnerships are shaping today's business model. Retrieved from https://www.digitalpulse.pwc.com.au/strategic-partnerships-shaping-todays-business-models/

Kicker, T. (2017). When It Comes to Corporate Partnerships, Remember These 5 Relationship Tricks. Retrieved from https://www.entrepreneur.com/article/298171

Auerbach, J. (2018). Why partnership is the business trend to watch. Retrieved from https://www.weforum.org/agenda/2018/01/why-partnership-is-the-business-trend-to-watch/

British Design Council (n.d.). The Design Process: What is the Double Diamond?. Retrieved from https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond

Nessler, D. (2016). How to apply a design thinking, HCD, UX or any creative process from scratch. Retrieved from https://medium.com/digital-experience-design/how-to-apply-a-design-thinking-hcd-ux-or-any-creative-process-from-scratch-b8786efbf812

MyFutures (n.d.). Tastbare Tools: Het denken over de toekomst heeft tastbare (fysieke/ontworpen) tools nodig. Retrieved from http://designmyfutures.wixsite.com/mijnsite

Maurya, A. (2012). Why Lean Canvas vs Business Model Canvas? Retrieved from https://blog.leanstack.com/why-lean-canvas-vs-business-model-canvas-af62c0f250f0

Pichler, R. (2012). The Product Canvas. Retrieved from https://www.romanpichler.com/blog/the-product-canvas/

Kalbach, J. (2012). The Project Canvas - Defining Your Project Visually. Retrieved from https://uxtogo.wordpress.com/2012/05/25/the-project-canvas-defining-your-project-visually/

Ivanov, A. and Voloshchuk, M. (2015). The Team Canvas. Retrieved from http://theteamcanvas.com/about/

Botta, C. (2017). Role Model Canvas in English. Retrieved from https://www.visual-braindump.de/2017/11/role-model-canvas-in-english/

ClearDesignUK (n.d.) How To Write An Effective Design Brief. Retrieved from https://www.cleardesignuk.com/design-brief.html

Over the Fence (2016). The Project Canvas. Retrieved from http://overthefence.com.de/project-canvas/

Deloitte (2018). The Future of Connectivity in IoT Deployments. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/de/Documents/technology/Connectivity-in-IoT-deployments-Deloitte.pdf