MASTER
GRADUATION
REPORT

MARTIJN
NIEUWENHUIJSE

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MARKETING DIGITAL PRODUCTS AT WITTEVEEN+BOS

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PREFACE

Throughout my master Strategic Product Design, I have been gaining knowledge about strategy, marketing, and vision development for organizations. For the past year, I have been captivated by designing the organizations themselves, which deviates slightly from the regular topics of this master's program. Designing processes for many stakeholders in a complex context sounds like a fascinating challenge to me. The report that you are about to read is a showcase of how I have followed and further researched this interest.

For the past half year, I have been working on researching the complex digital product development system at Witteveen+Bos. I set out to tackle the challenges that the organization currently faces in this area and, in the meantime, learn about navigating through a large organization, information management, and academic writing. The result of that is this graduation report, which is meant to advise Witteveen+Bos on their next steps in digital product development.

This graduation experience has taught me a lot about myself in various domains. This is all thanks to the advice of my supervisory team, the discussions and interviews with my colleagues at Witteveen+Bos, my fellow design students who have kept me focused on the bigger picture, and the unrelenting support of my family and friends.

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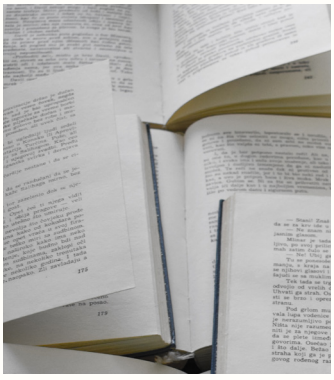
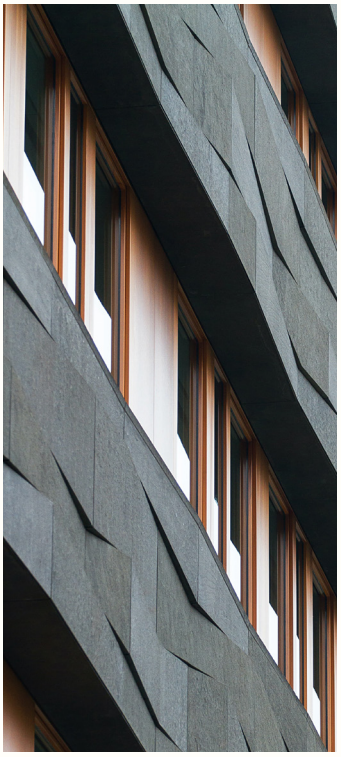
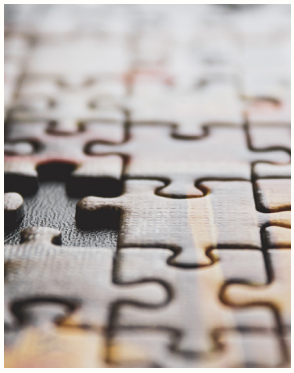






Summary

This graduation thesis for the master Strategic Product Design at the Delft University of Technology is written as a research and advice report for the civil engineering and advice agency Witteveen+Bos. More specifically for the Digital Acceleration product-market combination (PMC). The report answers the following question: "Is Witteveen+Bos as an organization structurally fit for developing, maintaining and marketing digital products?"

Simon (1989) explains that an organisation can have a product function or a capacity function. Witteveen+Bos has a capacity function, which means that it uses its assets (mostly the engineers) to help customers with their questions (read: complete projects for customers). This thesis studied that the wish for marketing digital products fits better with a product function, which means that an organisation develops products to their own specification that customers can buy on a free market.

When marketing products in an organisation with a capacity function, this organisation risks landing on a function-mix-border, which in turn endangers the continuity of the organisation (Simon, 1989). The lack of a product function in the organization also means that, up until now, the marketing of digital products at Witteveen+Bos has not gone as well as hoped for.

To market digital products, Witteveen+Bos needs to partly shift from a capacity- to a product function. This requires organisational change. Changing the function of the whole organisation is of course not desirable as it would mean that Witteveen+Bos would leave behind the project way of working, its core business, to only develop, maintain and market products. However, a local function shift is possible due to the organizational structure of Witteveen+Bos which is based on product market combinations.

The advice and conclusion of this report is to change the strategic function of the Digital Acceleration (DA) PMC. This means that this department changes into a product firm while the rest of the PMCs continue as capacity firms. DA will be separated and become a new product focused department. This will have little impact on the functioning of the rest of the organisation but does allow Witteveen+Bos to start the successful marketing of digital products.

While the function-mix is the main problem that hinders the development, maintenance and marketing of digital products, this report identifies four specific pain points that result from function-mix. These are:

Prioritisation: the product development process is not always a priority

Vocabulary: there is no shared vocabulary to streamline communication

Fame: the digital products are not as well-known among customers and employees as they deserve to be

Expertise: the organisation and the product owners do not always have the necessary expertise for managing new product development

These pain points have to be solved for a successful strategic function shift. This report provides a series of recommendations for potential gains in these respective areas.

Through separating DA from the rest of the business and thus changing the function from capacity- to product function, Witteveen+Bos will be organisationally fit to successfully start marketing the powerful digital products it already created and will be able to continue developing new products in the future.

Glossary

W+B	Witteveen+Bos: the organization that is the topic of this graduation project.
PMC	Product Market Combination: separate business units that all have their field of operations and form the organization together.
DAS	Digital Acceleration and Support: the sector within the organization that is responsible for the digital transition.
DA	Digital Acceleration: the department responsible for developing, marketing, and selling digital products within the PMCs.
DS	Digital Support: the department that is responsible for giving extra support to the digitalization of the PMCs and implementing and supporting organization-wide digital platforms
External Product Portfolio	The website digitalsolutions.witteveenbos.com. This website is meant for customers to get insight into the organization's digital capabilities. It is a showcase for digital products.
Internal Product Portfolio	A website on the intranet that houses more than 150 ideas for digital products. Development updates are also shown in this portfolio.
Digital products	An overarching term for all the digital automations that Witteveen+Bos develops or has developed.
Business lines	A collection of PMCs that have a field of operations. W+B has four business lines: the built environment; delta's, coasts & rivers; energy, water & environmental issues and infrastructure & mobility. DAS is a different sector but works similarly to the business lines.
Customers	The external customers that come to W+B for engineering advice.

CHAPTER1**INTRODUCTION**


+BOS

The Dutch civil engineering consultancy Witteveen+Bos (W+B) has efficiently grown its core business over the past 76 years to become one of the biggest names in engineering consultancy in the Netherlands (Velox, 2022). Additionally, the organization has grown considerably regarding its capabilities in the digital realm over the past few years.

Due to developments in the organization and customer wishes, the organization started a digital transition in 2019 to make the organization more digitally capable. At roughly the same time, leading competitors in the civil engineering field also started digital transitions (e.g. Arcadis (Expedition DNA, 2022), also see appendix 1). This was a non-coordinated development but a logical one: digital transitions of organizations have been set in motion in almost every field. It is considered an issue of survival that has become more important due to the coronavirus pandemic (The Enterprisers Project, 2022).

To guide this digital transition at W+B, the Digital Acceleration and Support (DAS) sector was initiated. Under the leadership of Otto Schepers, supervisor to this project, DAS has been working on three goals:

1. Giving extra support to the digitalization of the PMCs and other departments
2. Boosting the development, marketing, and sales of digital products within the PMCs'
3. Implementing and supporting organization-wide digital platforms

W+B consists of two Product Market Combinations (PMCs). These are smaller separate business units that together form W+B as an organization (Organisational Structure, 2022) (see Figure 1). These PMCs all have their respective field of operations like harbors or roads. DAS has two of these PMCs: Digital Acceleration (DA) and Digital Support (DS). DA is responsible for the digital products, whereas DS is responsible for supporting the organization with general issues and developments in the digital realm.

A big part of the digital transition, and the focus of this graduation project, is the work of DA: the development, marketing, and sales of digital products within the PMCs.

Digital Products

The organization can already take credit for developing some successful digital products through the shared efforts of DAS and the other PMCs. Examples of these products are InBeeld (a platform that involves a community in projects that change their environment) or the Fietsmonitor (a tool that helps visualize bike data for cities) (Digital Solutions, 2022).

The organization has an internal product portfolio that contains about 150 ideas for digital products and is currently working on marketing 21 finished digital products. These finished products have gone through a 'robustinizing' stage called the +Plus Innovation Program and have been sold at

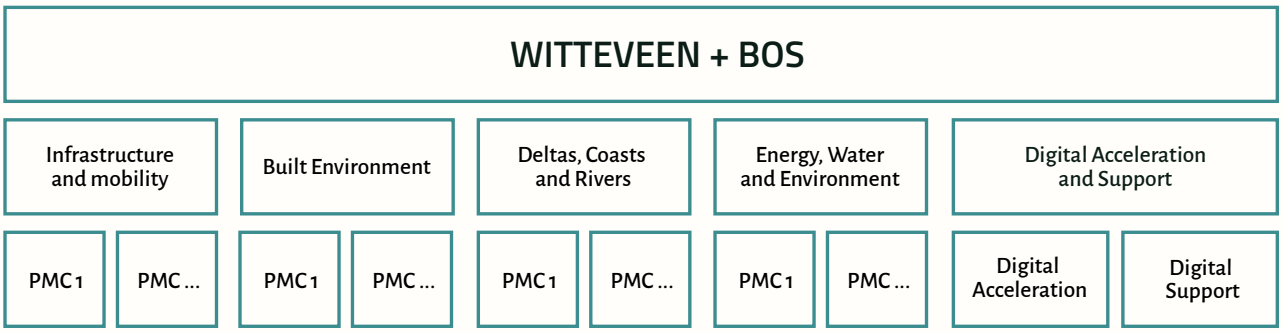


Figure 1 Organizational structure of W+B

least to one customer in a project. The digital products are managed by the product owner, who is usually the engineer that came up with the idea for the digital product.

With some digital products ready to go and a digital transition that has been heavily invested in, the organization is prepared to start earning revenue from these digital products. However, distributing and selling digital products in customer projects has been proven to be a challenge for W+B.

Project initiation

The initiation of this graduation project was based on the following question from W+B: what can we do to streamline the development process and scale up the use of our digital products?

'Scale up' in this question is still quite vague but can be explained with the metaphor of a bead chain. Imagine that every project W+B works on is a chain consisting of multiple beads. Together they finish the project. Throughout the years, W+B has used chains with analog beads like the engineer's time, prefab modules, findings from previous projects, formal quotations, etc. (see Figure 2) They have gotten good at these analog bead chains. For W+B, scaling up the digital products would mean that project chains will also include newly developed digital beads in addition to analog beads (see Figure 3). One step further would mean that some chains are entirely made of digital beads.

The metaphor explains the process of marketing new businesses instead of scaling up current efforts. Understandably, W+B has asked for a product scaling strategy since the products are technically developed already. However, digital products are not yet part of the bead chain and first need a stage of marketing, market penetration, and initial sales before they can be scaled. The digital products are in the startup phase.

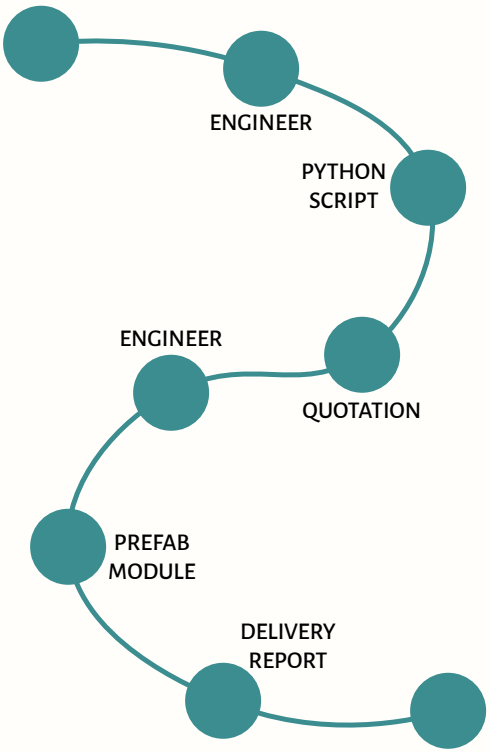


Figure 2 Analog bead chain

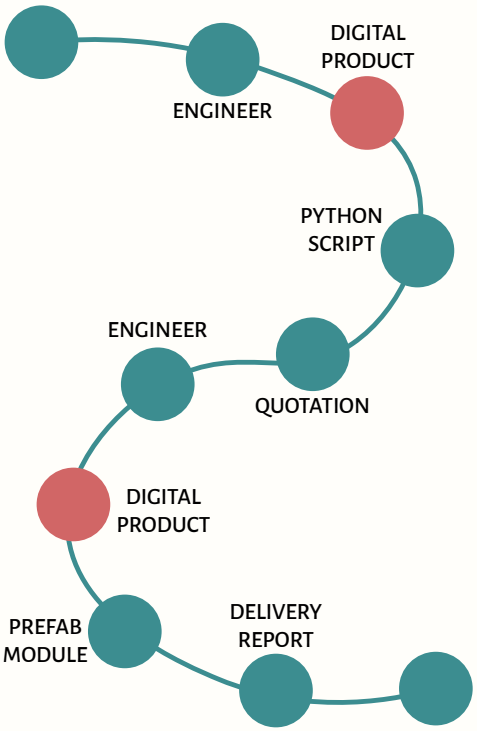


Figure 3 Digitally enriched bead chain

More importantly, the metaphor explains that W+B, a mostly analog organization that works solely on projects for clients, is trying its hand at new digital product development. This is a whole new process which knows many key characteristics, such as built-in instability and self-organizing teams (Takeuchi & Nonaka, 1986).

With this knowledge, it is important to take a step back and consider a different, more pressing question: Is Witteveen+Bos as an organization structurally fit for developing, maintaining and marketing digital products? The next chapter explores the answer to this question.

Approach

Due to the complex nature of this question (Snowden & Boone (2007) explain in their article why this context is complex), I chose to find the answer by following a systemic design approach. Though there are specific methods that are often used in systemic design, most of the literature proposes principles, tools and frameworks that fit with this approach and can help to solve these complex problems.

These principles, tools and frameworks are all a little bit different but overlap massively. My personal interpretation of what they mean together is visualized in Figure 4. This adapted framework is based on the works of (Bijl-Brouwer & Malcolm, 2020; Jones, 2014; Ryan, 2014; Snowden & Boone, 2007; Torres, 2018). This framework also provides the overarching design method for this graduation project.

The project started with a diverging phase of immersion and inquiry after which the found information was framed to form a problem definition. This provides focus for the later stages and marks the end of the observation phase. The move to design follows. From there, formulating the solution is, again, a diverging phase where solutions get explored and conceptualized after which the generation phase focuses on one solution and its implementation. Continuous reflection on earlier stages is necessary to provide focus.

Throughout the process, I continuously did three things:

1) Look at the context of the system I'm operating in and the relations with other (sub-)systems.
2) Reflect on my personal development and growth.
3) Keep an open mind to the complexity of the system and the solutions it might need.

Explanation on how neccesary information was gathered during this project can be found in appendix 2.

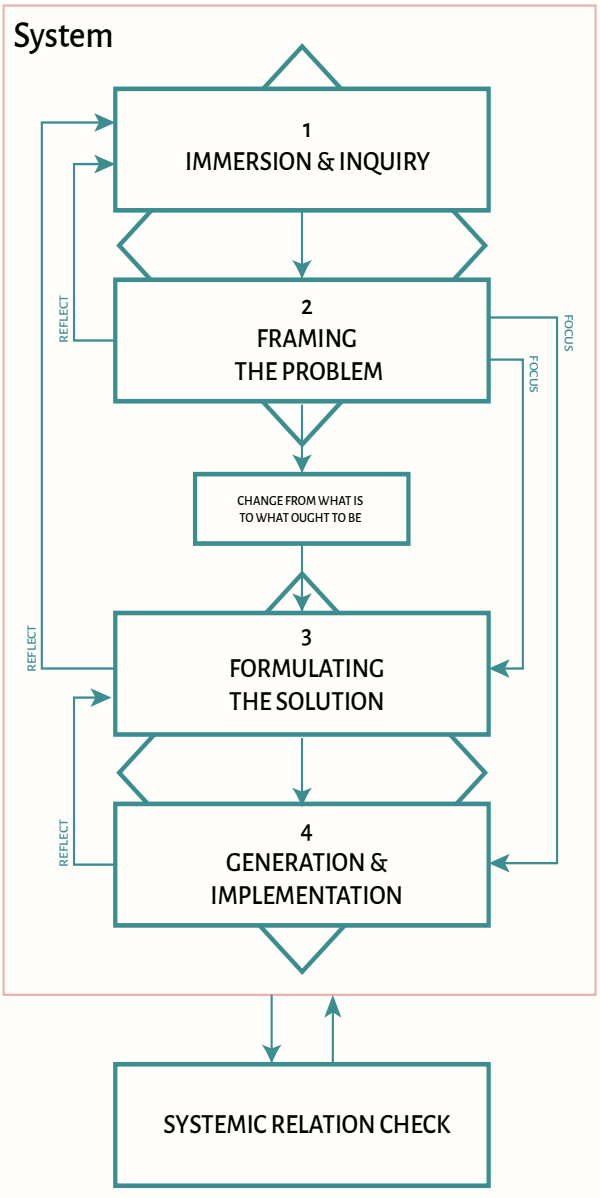


Figure 4 Personal systemic design framework

Report structure

Although the systemic design framework in Figure 4 provides the approach for this project, the report is structured slightly differently. This is to increase readability and provide better understanding of the main topics.

The report consists of eight parts (see Figure 5)

1) **Chapter 1** provides necessary context to understand the remainder of the report.
2) **Chapter 2** frames the general problem space (step two in Figure 4). Here I will provide findings from literature to substantiate the problem.
3) **Chapter 3** formulates the solution (step three in Figure 4). I provide the general steps and recommendations for W+B to solve the question posed in part 1.
4) **Chapter 4** provides a possible intervention strategy (the implementation part of step four in Figure 4). A roadmap and a recommendation for change management will be provided to guide the implementation of the intervention in chapter three.
5) **Chapter 5** dives a bit deeper and shows the observed difficulties that W+B is currently facing (step one in Figure 4).
6) **Chapter 6** moves to provide recommendations to deal with these difficulties (generation part of step four in Figure 4).
7) **Chapter 7** discusses the limitations of this research and advice.
8) **Chapter 8** provides some essential extra information as appendices.

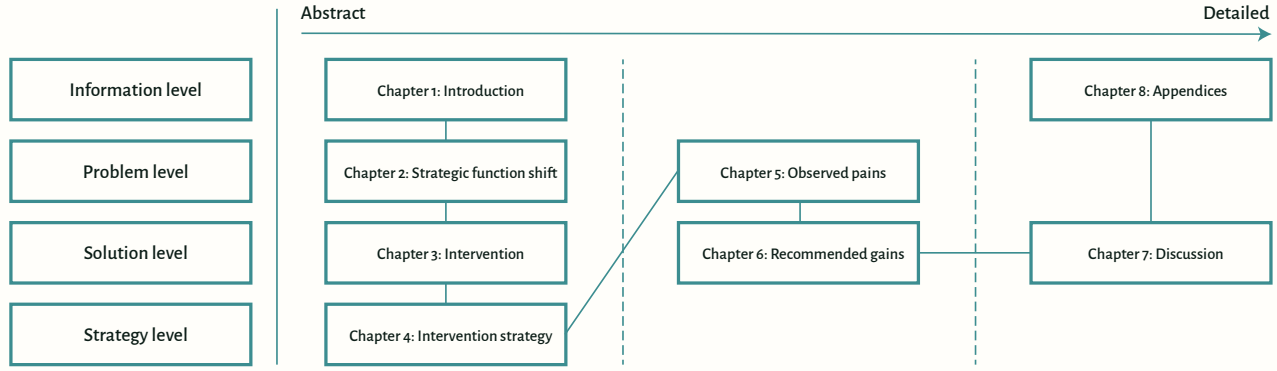


Figure 5 Report structure

CHAPTER2**STRATEGIC FUNCTION SHIFT**


Literatur
Literatur
7

While searching for theory about organizational models for product development to help answer the main question posed in chapter one, I found the comprehensive research of Martin Simon (Simon, 1989), who writes about different kinds of organizations that each have different management strategies. Simons's research shows that an organization can be either a market- or a task organization with either a capacity- or a product function (Table 1)

W+B starts about 4000 projects each year and their engineers work tirelessly with the customer to reach the desired result. This is why W+B says: "Engineering is people's work" (Engineering: People's Work | Witteveen+Bos, 2022). The engineers are W+B's most valuable asset, and this project-based way of working is equivalent to the capacity function described in Table 1.

Since the organization competes for work in a free market and has a capacity function, W+B is a market organization with a capacity function (MC). However, as discussed earlier, the PMCs work as separate business units under W+B. This makes that we can consider the PMCs to be separate MC organizations.

Problem statement

Organizations with a product function are categorized by a much longer product innovation process than organizations with a capacity function (Smulders, F. & Dorst, K., 1997). This is shown in Figure 6. The difference is that product firms need to create a vision, strategy and need assessment of their own market while capacity firms focus mostly on the market of their customers which eliminates the need for the first part of Figure 7. W+B is an organization that can be categorized as having a capacity function. This project way-of-working, however, does not fit with the desire to independently put digital products in the market. For this, the organization needs a product function. W+B currently does not seem to have such a product function.

This means that the research question posed in chapter one ("Is Witteveen+Bos as an organization structurally fit for developing, maintaining and marketing digital products?") needs changing to "Does W+B have a dedicated product function?" to which the answer currently is no.

ECONOMICAL STATUS / KIND OF OUTPUT	**Market organization** This type of organization works for the market. Their customers are free to choose a supplier and the company can choose who they work for. They are not reliant on one customer.	**Task organization** This type of organization works for another organizational entity that determines the future of this organization. They are reliant.
Product-function An organization with a product function makes products for the market that people can buy.	**MP** Market organization with a product function	**TP** Task organization with a product function
Capacity-function An organization with a capacity function uses their assets (capacity) to help customers.	**MC** Task organization with a capacity function	**TC** Task organization with a capacity function

Table 1 The strategic function typology matrix by Simon (1989)

However, no organization is a pure form of one of these four types (Simon, 1989). There is always some mix of market and task status and a mix of product and capacity function. This function-mix is what we currently see happening at W+B, specifically within the PMCs. PMCs work on products while maintaining a capacity function. This is visualized in Figure 7.

Function-mix-borders

Although no organization contains only one strategic function, there is a danger in shifting function too much. When an organization, for example, has a product function but relies on its capacity for more than around 15-20% of the total work (or the other way around), the organization finds itself on a function-mix-border (Figure 8)

According to Simon (1989), an organization's continuity is in danger when it finds itself on a function-mix-border.

The continuity of an organization is about the processes, procedures, decisions, and activities to ensure that an organization can continue to function through an operational interruption (Continuity Central, 2022).

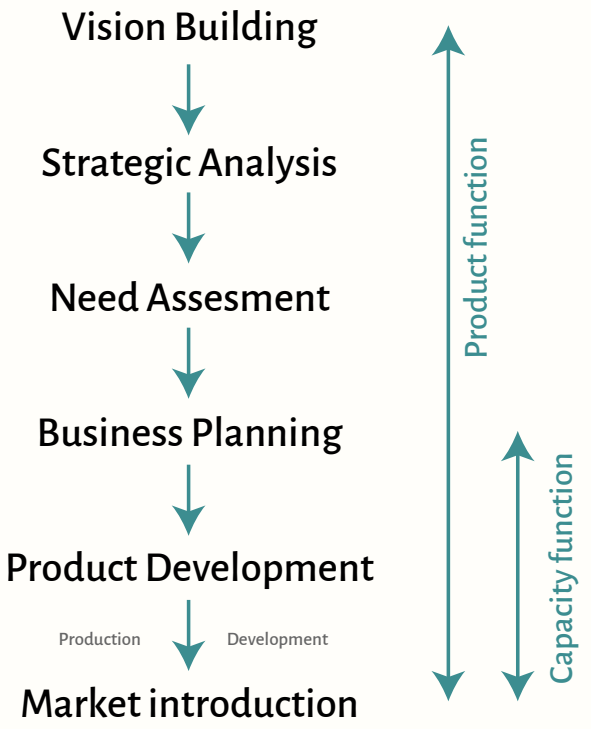


Figure 6 Simplified reproduction of product innovation process (Smulders, F. & Dorst, K., 1997)

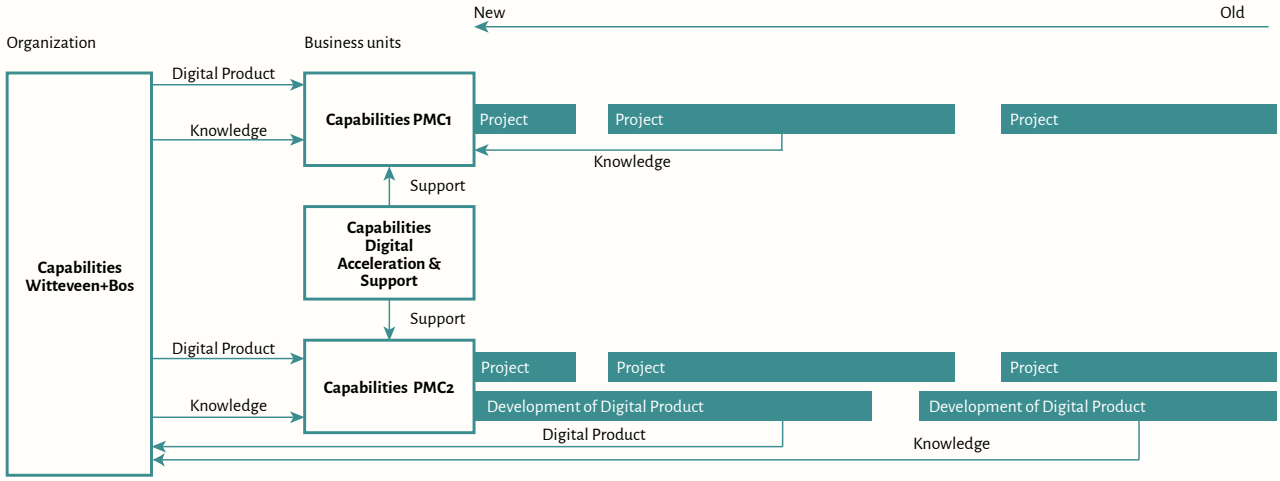


Figure 7 Capabilities and knowledge sharing at W+B

ECONOMICAL STATUS / KIND OF OUTPUT	Market organization	Task organization
Product-function	MP	TP
Capacity-function	MC	TC

W+B

Table 2 W+B shifting function

Continuity in an organization ensures its resistance to difficulties, both from within and from the outside. When an organization's continuity is in danger, the tendency is to zoom in on certain well-visible aspects of the organization that might cause this tremble in the continuity (Simon, 1989), like revenue trends, competitor developments, or the employees. However, due to the complexity of continuity problems, zooming in is not the way to solve them. The organization needs to zoom out and look at the whole organization.

To prevent a threat to the continuity of an organization on a function-mix-border, Simon (1989) mentions that either the organization's strategy or the organization itself needs to change. In the case of W+B, this means the following:

Change of strategy

The organization stops with shifting towards a product function, and the organization continues with its core capacity function. W+B stops focusing on the product function and thus stops developing and marketing digital products. This is, of course, not desirable because of the investment in DAS and the amount of work that has been put into the digital transition.

Change of organization

The function of the organization shifts, and the organization changes to accommodate this shift. For W+B, this means that the organization takes on a new product function and halts its capacity-based way of working (see Table 2). This is not desirable either because it touches the core business and revenue stream for W+B.

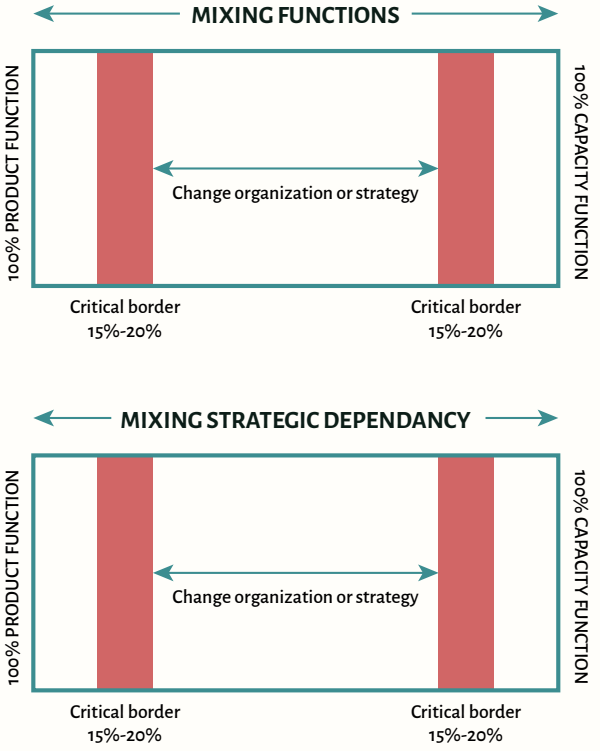
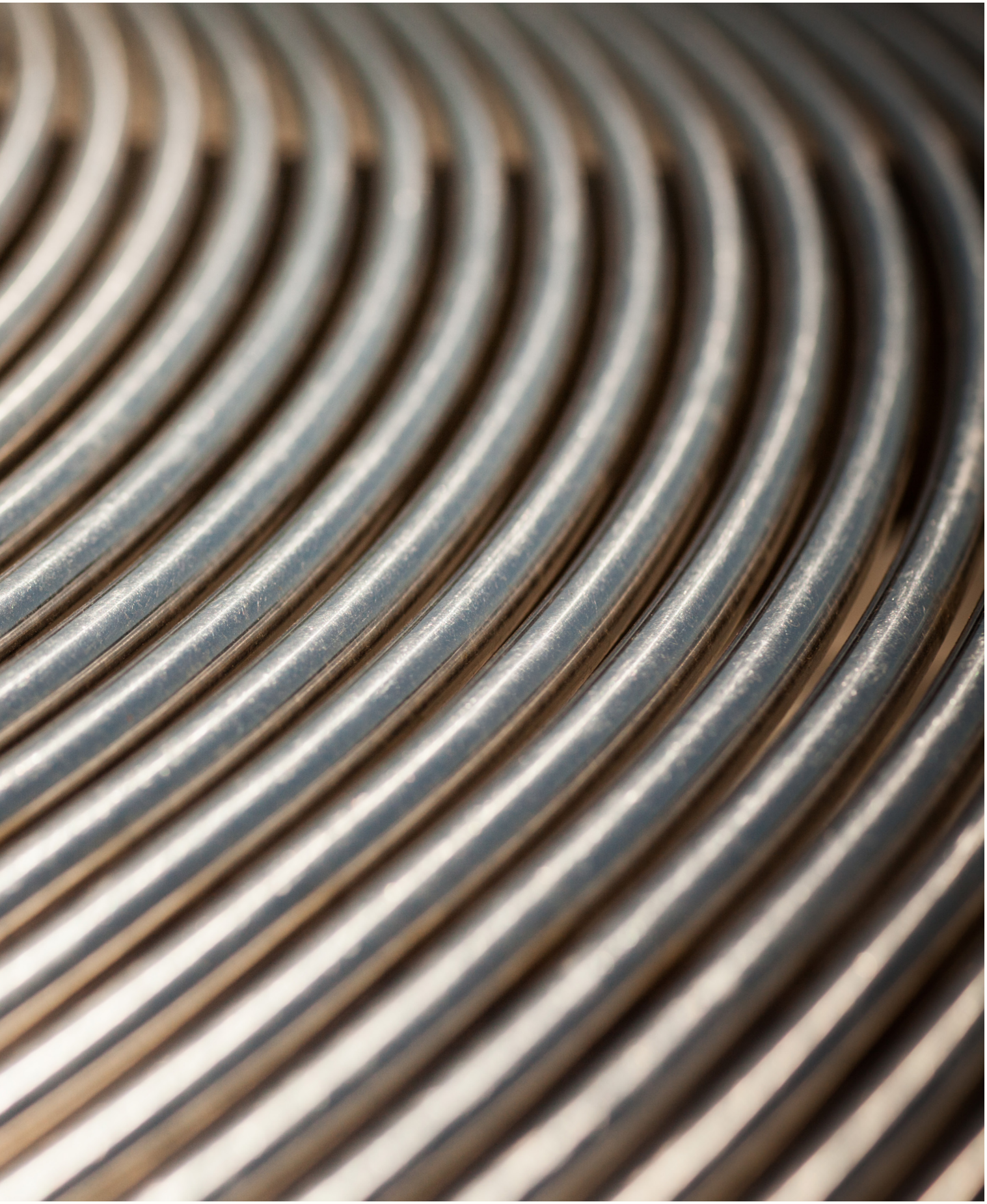


Figure 8 Function-mix borders

CHAPTER 3 **INTERVENTION**



The previous chapter showed that an organization needs a product function when it desires to develop and market digital products. W+B currently does not seem to have such a product function and thus is not structurally fit to independently put digital products in the market. Shifting the organization's capacity function to a product function will solve this but shifting too much might be dangerous for the organization's continuity. To prevent that, a strategic- or organizational change must be made.

It seems like there is no desirable solution for W+B that allows them to market their digital products. Both a strategic and organizational change of the whole organization is not ideal for dealing with the necessary function shift from capacity- to product function. However, due to the organizational structure of W+B, with its separate business units (PMCs), a local organizational function shift is possible.

This chapter describes a local organizational function shift that has resulted in the design of a changed/new department that will allow the organization to solve the four pains that are presented in Chapter 5.

Local function shift

Figure 9 illustrates what the organizational output would look like if the function of the whole organization changed from capacity- to product function. This is, as mentioned in chapter one, not desirable. The core capabilities of W+B still lie in their capacity, which are their engineers solving projects. They are good at what they do and should keep on doing so.

Therefore, we need to look at a local organizational function shift. As mentioned in chapter one, we can consider the PMCs as separate organizations under W+B. This organizational structure allows us to not only consider changing the function of the organization that is W+B, but we can also consider changing the function of one or a few of the smaller organizations that make up W+B: the PMCs.

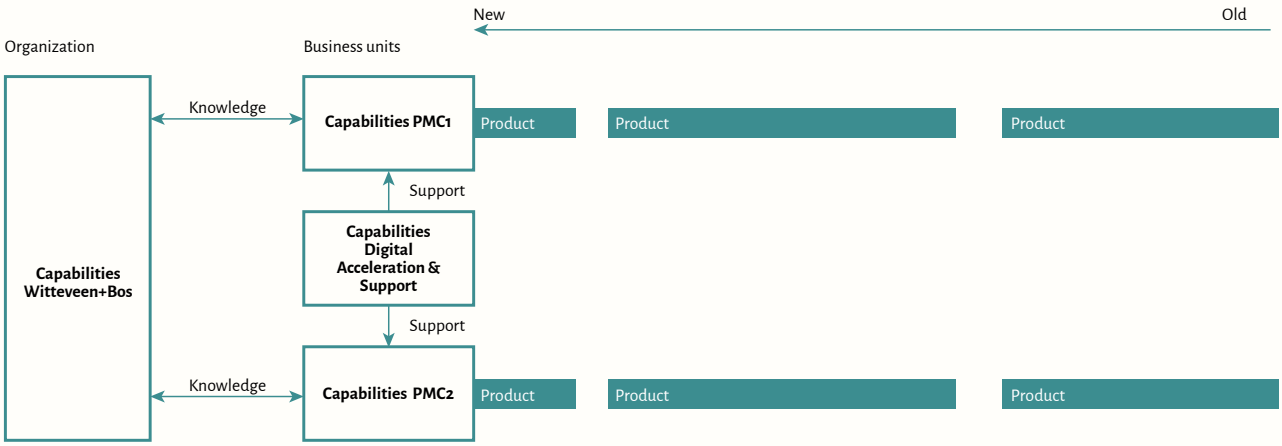


Figure 9 The whole of W+B having a product function

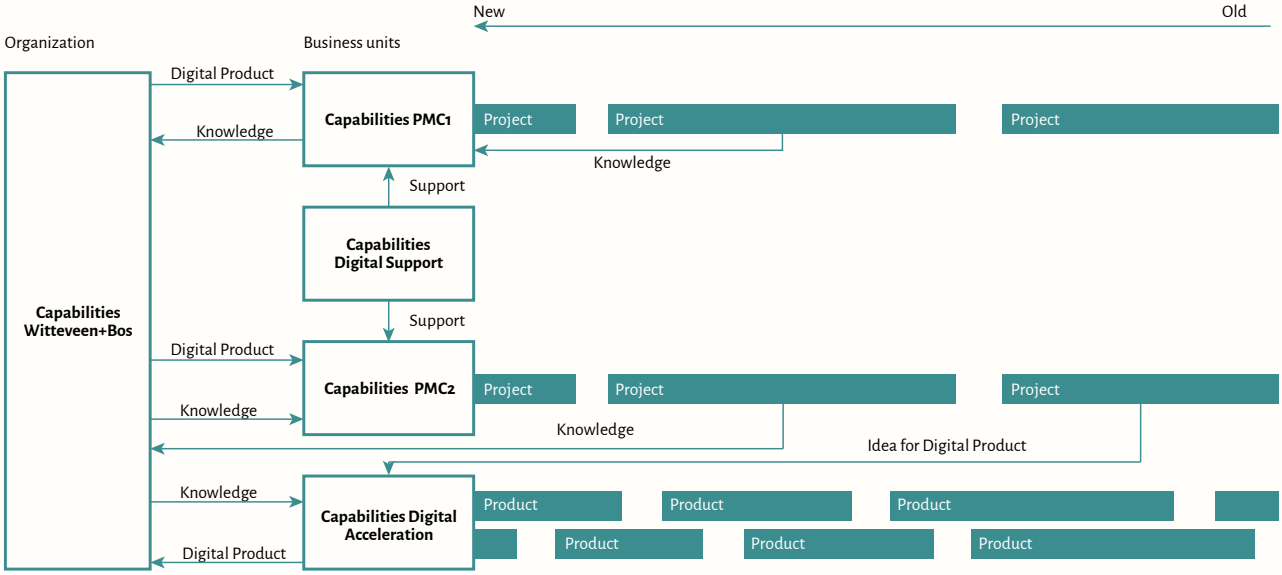


Figure 10 The separation of Digital Acceleration

Separation of Digital Acceleration

A logical choice for a part of the organization that could adopt a product function would be the department that is already focused on developing and selling digital products: Digital Acceleration (DA). Although it is technically not a PMC (in fact, none of the PMCs are because they have no products), it can be considered a separate market organization with a capacity function (they solve projects for the other PMCs and sometimes customers).

As shown in figure Figure 10, changing the function of DA would not impact the organization's core capabilities negatively but rather excludes the product development from the PMCs as a capability expansion (Leonard-Barton, 1992). In other words: by pulling DA away from the regular capacity-based PMCs and giving it a product function (see Table 3, note that not W+B but only DA shifts as opposed to Table 2), the organization as a whole can go on to function as they are used to while also being fit for the development, maintenance and marketing of products due to a separate

ECONOMICAL STATUS / KIND OF OUTPUT	Market organization	Task organization
Product-function	MP	TP
Capacity-function	MC	TC

DA

Table 3 Only DA shifting function

product-focused department. DA would function as a market organization with a product function under W+B, while the other PMCs keep functioning as market organizations with a capacity function.

Although a product function entails more than just product development (Smulders, F. & Dorst, K., 1997), the separation of a product-focused department into an MP also fits with the theory on new product development. In their article on managerial characteristics for new product development, Takeuchi & Nonaka (1986) mention that product development teams function largely as self-organizing teams, autonomous from the organization, but are still subject to subtle control from that organization. This resonates with the separation of the department from the other PMCs while remaining under the umbrella of the W+B market organization.

Aforementioned conclusions about the separation of DA creating a product function leaves us with an answer to the question that W+B posed as initiation for this project: "what can we do to streamline the development process and scale up the use of our digital products?"

The answer is that Digital Acceleration needs to be separated from the capacity-based PMCs to go on as a market-organization with a product function. Digital Acceleration will thus become a new department.

Important to note is that the function of Digital Support (and the rest of the organization) will not change (see Figure 11), and for good reason. Considering the digital transformation, the rest of the organization will still need support for digitally enriched projects on a capacity basis. The importance of Digital Support in this role will even grow since they will be the only department offering support for digital matters now and will likely also be asked for support by the new product-focused Digital Acceleration.

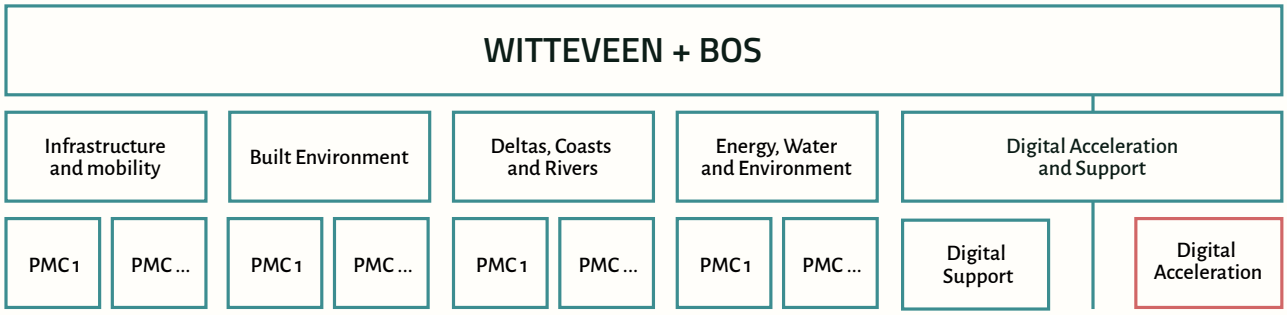


Figure 11Digital Acceleration separated. The line shows where the separation between capacity- and product function. DA is marked red to show it has a different function.

CHAPTER 4 INTERVENTION STRATEGY

Corporate survival depends on successfully managing the evolution and expansion of the core capabilities of an organization (Leonard-Barton, 1992). Core capabilities are a set of competitive pieces of knowledge that distinguishes an organization. This could be, for example, faster processes, better products, or more competent people. The core capabilities of W+B are currently similar to their capacity. Engineers use learnings from the many projects to enhance the capacity and, therefore, the core capabilities. In other words: every project improves their skills for future projects.

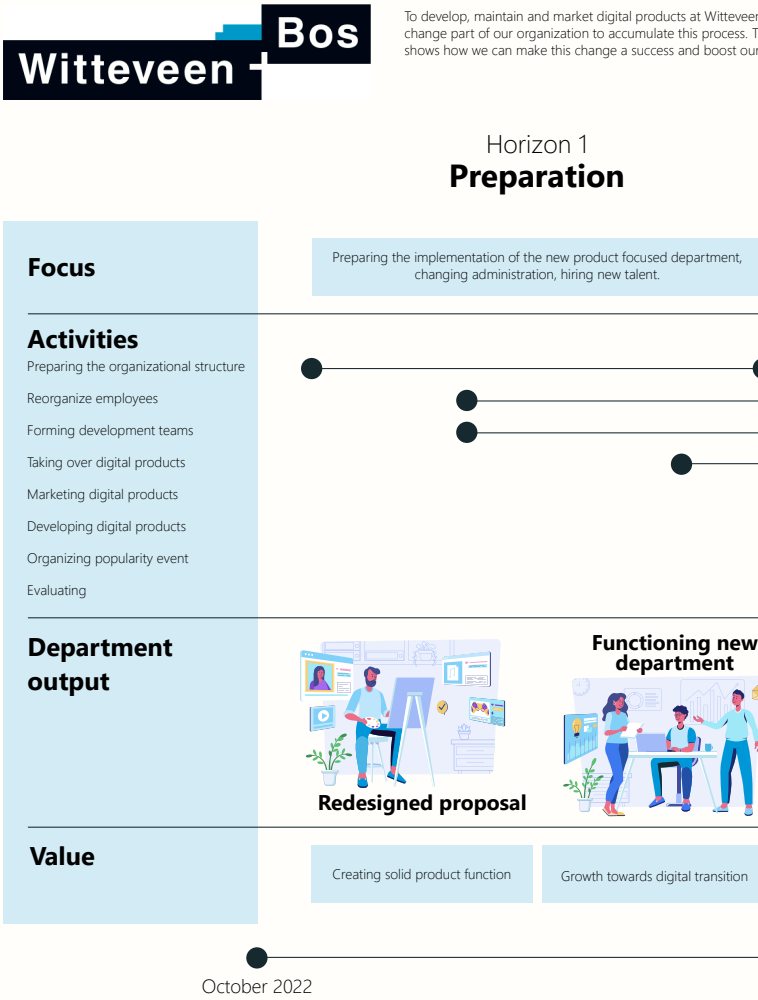
Adapting a product function could provide W+B with another differentiating, and thus competitive, capability. We must consider the management of this transition well since the conflict between core capabilities can inhibit innovation (Leonard-Barton, 1992).

Therefore, this chapter describes the strategy behind implementing the intervention to separate DA, described in the previous chapter. The steps and timing of this strategy are visualized in a strategic roadmap (Figure 12) but the strategy for this intervention also entails recommendations for change management since the intervention will be impactful for many employees.

Strategy

The roadmap in Figure 12 shows my recommendations for the intervention strategy. It is meant as a guide for how W+B can go about changing the function of DA. It is a point of reference throughout the organizational change that needs to take place.

The roadmap is split into three horizons. These are the three main steps towards the future vision that is shown on the right of the roadmap. This future vision is how I see what W+B is ultimately working towards with the digital products.



n+Bos, we need
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Strategic Roadmap for DA

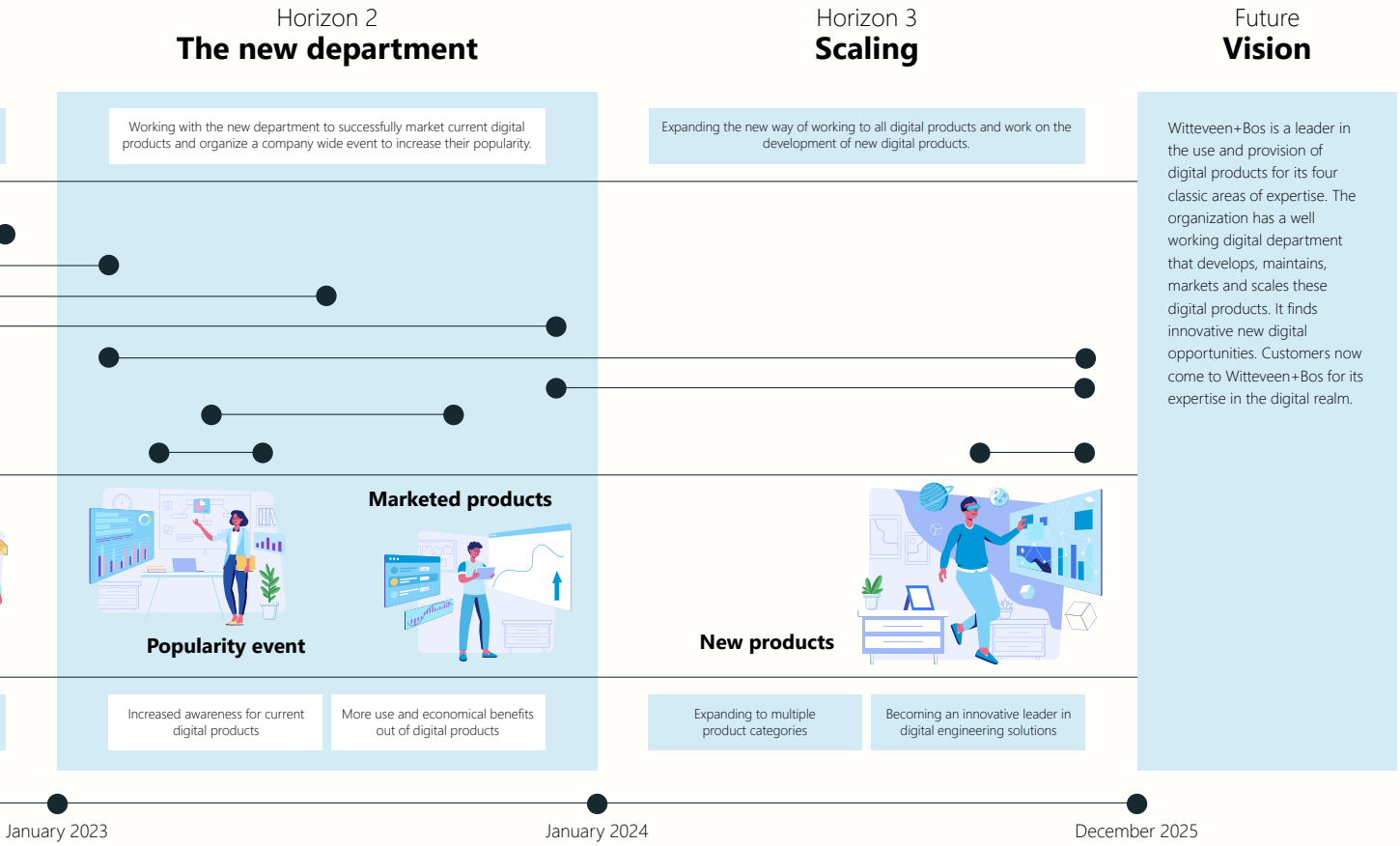

Figure 12 Strategic roadmap for DA

In the first horizon, the start of the new department is prepared. The vision and market for this new department will be defined, employees will be transferred to the department, product teams will be made and the administration for the department will be finalized for the launch in horizon two. In this phase, the first digital products that will be taken over by the new department get chosen and prepared for launch.

In the second horizon, the department starts working with the new product function. The product teams will be initially working on marketing a few current digital products. When the department is up to speed, focus will be expanded to other areas. This includes the organization of a company-wide popularity event for all the current digital products (see Chapter 6) and taking over more digital products.

When the department is fully running, the first digital products have been marketed and the popularity of all products has risen, the third horizon gets in sight. Here the focus lies on expanding the portfolio by developing new digital products. The portfolio and the use of products will be scaled in this horizon to work towards the future vision.

This way, the organization will gradually expand its digital product department. The current digital products will gradually be taken over by the product teams and will be robustinized and marketed for bigger returns and the possibilities for the development of new digital products will be explored.

Change management

The function shift, and the accompanying installment of a new department, is going to be quite a change for DA as well as for the whole organization. W+B says: "engineering is people work" and thus, we need to see what impact this change will have on the people and how to guide them through the change. I spoke with a human resources management expert about this process (Nieuwenhuijse, V., personal communication, 2022), who provided me with necessary considerations regarding change management.

As is the case with designing for complicated and complex systems, there is a difference between handling planned and emergent change. In order to bring about successful organizational change, both of these types of change are necessary. Purely planned change will not sit well with employees (they would feel like they are not part of the change) while purely emergent change will decent into chaos.

Thus, like with systemic design (see Chapter 1) probing is needed. In human resource management, this is called pendeling: having a goal on the horizon, providing a first step towards that goal and then let the change provide the course. With this project I have tried to create that first step: the function change should set about a series of events that will change the organization in the necessary direction. After this, it is up to W+B to take over and implement it. Throughout the process of changing the organization, it's important to remember that the planning of this implementation is going to be linear but that the implementation itself will be non-linear, and that is fine. The implementation will always deviate from the planning. Flexibility is key in pendeling and it is important to switch between moments of nudging in the right direction and moments of letting people figuring things out themselves.

An important prerequisite for successful guidance of organizational change is the need of employees for that change. They must feel like the change is necessary otherwise they might not sympathize with the change. I have tried to create a need for change by giving presentations to the team, sharing my blogposts with them and discussing the problems with individual team members. This, together with the fact that this issue was a topic for longer time, lead to multiple team members already asking about the possibilities for a change within the department, which is a good sign. I believe that this report and my final presentation to the team will also contribute to this. However, I recommend putting more effort in creating the need. This effort should not only focus on the employees that will have to deal with the change, but also on the management that has to allow it. The whole organization must feel that something should be done about the structure that allows digital products to be developed.

Recommendations for change management

To successfully guide this change within the department, the team manager (or change agent (Armenakis et al., 1993)), needs to look at both an individual and a group level. Both of these are important for guiding the employees through the proposed organizational change.

At the individual level, the changes need to be tackled like a mourning process. Employees will say goodbye to something they have been used to for a while and they need to accept a new situation. This is like mourning and can be guided in three ways:

- **Conceptually:** work on people's mindset towards the change. This could be done by a campaign that explains aspects of the change.
- **Offer closure:** organize a moment where the change fully goes into effect (read: an event or moment where people say goodbye to DA and celebrate the 'birth' of DD). This plays into the importance of rituals for dealing with change.
- **Participation:** nobody wants change, so people will resist it. When people resist change, it is a good sign. It that means people care about the change, it is just hard to swallow. To ease this, people must participate in the implementation of the change, make them work for it to create a certain ownership over the change.

At the group level, I recommend organizing teambuilding activities that show what the team is working towards. It is very important that, on the group level, everybody knows what the goals of the changes are. A way to encourage participation on the group level is self-managing teams (see Chapter 4).

CHAPTER5**OBSERVED PAINS**

After discussing the design intervention and the accompanying strategy, it is important go into further details about this intervention and the resons behind it.

Simon (1989) mentions that companies that are shifting from a capacity function to a product function often focus on specific pain points that cause difficulties in the organization. Focusing on these pain points does, however, not help because the strategy or the organization needs to be changed first. This is apparent at W+B, but this report has already provided an intervention for organizational change.

In the inquiry phase of this project, I discovered a series of pain points that the organization is currently dealing with. These pains were abstracted from interviews with colleagues and product owners and from creative sessions with colleagues and fellow design students. They are a result of the desire to put digital products in the market while maintaining a capacity function.

Although there is a good chance that the intervention mentioned in Chapter 3 will help the organization in creating a solid product function, this cannot be said for certain. The nature of complex problems is that interventions only provide a boost in, hopefully, the right direction. Thus, I believe it to be important to give insight in the difficulties that W+B is dealing with and that absolutely need attention when conducting the function change and creating the new department.

In this chapter, I will explain the four main pain points that W+B needs to overcome to execute the function shift successfully. The next chapter holds a series of recommendations on how to turn these pains into gains.

The four pain points I describe below are:

- **Prioritisation**: the product development process is not always a priority
- **Vocabulary**: there is no shared vocabulary to streamline communication
- **Fame**: the digital products are not as well-known among customers and employees as they deserve to be
- **Expertise**: the organisation and the product owners do not always have the necessary expertise for managing new product development

Prioritization

The difficulties with prioritization lie in the fact that other processes at W+B have a higher priority than the development, maintenance and marketing of digital products. This is primarily attributed to the function-mix: the capacity function of the organization naturally results in the prioritization of projects, with products coming after. This prioritization is a challenge for both the product owners of the digital products as well as for DA.

It is hard for product owners to prioritize their respective products. Being a product owner often feels like a side role or a sub-task. In some cases, this is because the product owner does not necessarily want to be in the position (e.g., the product owner was put in the position because they were available at that time). However, more often, the product owner cannot entirely focus on the product because their time is needed to work on customer projects.

The Digital Acceleration (DA) department decided from the start to develop and manage the digital products within the PMCs. This was a strategic choice to allow the whole organization to grow digitally. However, this means that the responsibility for developing and marketing the products still lies in the PMCs, while the desire to do this lies within DA.

Vocabulary

Good communication is critical for an efficient development process. The vocabulary pain point results from ambiguity in the terms used in the organization regarding the processes around digital products. This ambiguity in terminology makes that there is an opportunity to create a shared vocabulary. There are three ambiguous/non-defined terms which could use clarification: Digital Solutions, Product Owners and Product Portfolio.

Digital Solutions

The most used overarching term for all the digital products at W+B is 'Digital Solutions'. This is also the name of the portfolio website for external use (Digital Solutions, 2022). The organization also talks about Digital Services (or 'digitale diensten' in Dutch) and Digital Products. The terms generally mean the same thing, and no real distinction between the different digital products is made with the naming.

However, analysis of the digital products showed that there are three different kinds of digital products which have a specific goal and use. These will be explained further in Chapter 6. A difference in what the products do indicates a need for clarification in the terms used to point to these different digital products. The distinction between these different kinds of products is not yet used.

Product owner

The role of the product owner is a relatively new one for the organization. The growth of digital products over the past couple of years has, with it, created the role of the product owner. This sudden growth resulted in the fact that the role of the product owner is not really defined. Therefore, different product owners do different things and for some it is difficult to determine what their role and ownership entail.

Product portfolio

DAS implemented the internal product portfolio as a tool that would allow them to get an overview of all the ideas for digital products that were floating around in the organization. Many engineers come up with ideas for digital products throughout their work. To gather as many ideas as possible, there are no admission criteria for what can be entered in the portfolio. Through the portfolio, DAS can monitor progress and push the teams to work on development.

The portfolio has rapidly grown over the last years and now includes many ideas. This growth allows for more ideas for digital products to hatch but now also creates questions about the portfolio's purpose. It is unclear what the portfolio is meant to do for the rest of the organization.

Fame

Reaching a certain amount of fame for the digital products is necessary to sell these products, both internally and externally. It will not sell well if people do not know about your product. The innovative digital products that W+B develops deserve to sell well but reaching the necessary fame has proven to be challenging. This is a pain point both in pushing the products to the engineers of W+B that will use them and to the customers that have to buy them.

The organization has put some effort into internally and externally promoting the digital products. The internal market consists of the engineers that will use the digital products in their project to create more value for the customers. Promotion efforts have occurred on the intranet, the newsletter, and the organization's social media platforms. However, still too few engineers in the organization know about the digital products' existence, and even fewer know their worth and what they can use them for.

This is troubling since these engineers are the people that will deploy the digital products in the projects and thus sell them to customers.

For the external market, the organization has made the external portfolio website. Customers of W+B can filter and find digital products that can help them solve their problems. The DAS sector has, however, not yet noticed an increase in customers asking for digital products. The products need to be pushed to them.

To a lesser extent, the fame of the role of product owner is a challenge on its own. The role is not as valued and popular as it should be. This makes finding a new product owner when one quits, or time to work on the product, difficult.

Expertise

The digital product development process is relatively novel not only for the product owners but for the whole organization. The launch of the DAS sector boosted the development and introduced new talent that can help with this development. They are now reaching the next stage: selling the digital products. For this stage, the organization has not yet embarked on a similar growth path which means that current talents are not always comfortable with, or trained for, this next stage.

Management of the products faces a similar challenge. New product development knows many facets, and in addition to marketing and sales, management skills like leadership and experience with market introduction are essential. The need for these skills in the product development process was not as apparent in the early stages due to the focus on technically developing the digital products first. With the door open for a new stage, however, the need for product owners to have expertise in these skills grows. The use for these new skills becomes more apparent in yet undiscovered parts of having a product function like market definition, value proposition, the setting of key performance indicators, and the creation of sustainable business models.

CHAPTER6**POTENTIAL GAINS**

This chapter holds a series of recommendations for system interventions that can help overcome the challenges mentioned in chapter two. The recommendations are structured to answer the four main challenges (prioritization, vocabulary, fame and expertise). I will also give possible manifestations for how these recommendations, when followed, could look like. These were created with fellow design students and with W+B employees.

The recommendations are meant to help smoothen the execution of shifting the function of DA from product- to capacity function. This is a big operation and thus turning the pains into gains can be beneficial. The manifestations attached to the recommendations serve as possible detailed examples of what such a gain could look like.

As shown in the previous chapter, there are a lot of pain points involving product owners. I will first discuss the recommendations for the position of product owner, and then continue with recommendations for the other four main pain points. There are also some recommendations that do not necessarily fit under one of the four main challenges but are important to consider for the success of the function shift.

Recommendations for product owners

I recommend changing the position of 'product owner' to 'product manager'. This is a widely known job that has certain characteristics like understanding user needs, monitoring the market and defining a vision for a product (Atlassian, 2022). The term better fits the position as the product manager does not personally own the product but is in charge of managing its progress.

To help overcome the prioritization pain point for product managers, I recommend giving the position of product manager to someone within the new department and not someone within the PMCs. This task is currently usually given to the engineer that initiated the product. The engineers that come up with the digital product should, however, remain a part of the product teams (on a part-time basis, besides their work in their own PMC), but the managing responsibilities should fall on the shoulders of someone who does not need to focus on projects for customers. Making product manager a dedicated position also solves the popularity/fame challenge the position of product owners currently faces.

For clarity about what the position means, I recommend writing a job description or a list of responsibilities. This informs the product managers about what they should focus on and the rest of the organization about what they can reach a product manager for. For increasing this clarity about the position, and to help with overcoming the expertise challenge, it is recommended to either train current employees in the necessary skills for product managing, or to hire new product managers that already have experience with this job.

Recommendations for prioritization

The installation of a new department would already solve a lot of the pain points faced regarding prioritization. A dedicated department with a product function instead of working out of a capacity function prioritizes the process that is needed to make the digital products a success. It is, however, important to keep the function in mind in this new department as to not fall back to the familiar support-based way of working. I recommend channeling all internal support requests to the Digital Support PMC. Customer support for the digital products themselves is of course handled by the new product focused department.

It is also recommended to create self-organizing teams within the new department. “A project team takes on a self-organizing character as it is driven to a state of "zero information" where prior knowledge does not apply. (...) Left to stew, the process begins to create its own dynamic order. The project team begins to operate like a start-up company - it takes initiatives and risks, and develops an independent agenda.” (Takeuchi & Nonaka, 1986) This will help combat the challenges regarding prioritization because the team now “appear to be absorbed in a never-ending quest for ‘the limit’”(Takeuchi & Nonaka, 1986).

Recommendations for vocabulary

Naming the new department

With a new department comes a new name. Giving the Digital Acceleration a new name helps with clarity about the function of the department as well as helping to communicate the function shift. A new name can help to show that the department is different.

An example of a new name, based on creative sessions (see Appendix 2), is ‘Digital Development’. For the remainder of the report, I will refer to the new department with a product function as ‘digital development’ or ‘DD’.

Naming the digital products

To increase clarity about the different kinds of digital products that W+B has, I recommend naming them according to their respective target group. Analysis showed that there are currently three different kinds of digital products.

The first of those is a non-finished kind of digital product that I call ‘digitools’. These products are not yet finished or polished enough to push to customers but can be used in projects. This is more about personal preference of the engineers working on the project. Digitools don’t have to have a name since they won’t be communicated, but it is important to know that this type of digital product exists.
However, the other two types of products are important to name. This makes classification of products clear for both the product team and for the customers. I found that there is one main difference in the finalized digital products: is the product sold internally or externally? The digital product can be either standalone and ready to use for customers of W+B, or they are more supportive to projects. In the first case they are sold externally and in the second case they are sold to the internal market of engineers that work on the projects. So: is the product used in projects by engineers or is it sold standalone to customers? The products should be named accordingly.

As a manifestation of this recommendation, I named the digital products as follows:

Digital Product for Engineers (DPE)
Automations and digitalized software products for customer projects. They help with the development of results for customer projects using data or calculation power. They are saleable and marketable but are used by W+B engineers in projects for customers.

Digital Product for Customers (DPC)
Software products that customers can request to license or buy for own use. They help a customer figure out a solution to their problem in a customer friendly way. They are sold and marketed directly to the customers.

Important to note is that both are called 'digital products'. Calling both the variations a digital product is recommended for different reasons:

1) The department will change from a capacity function to a product function and the names now indicate that.
2) Calling both variations digital products eliminates the use of 'digital services' and 'digital solutions'. This makes it clear that the difference between the two lies in the target user of the product.
3) Some of the digital product have service aspects but are still meant to be put as a product in the market, whether that is an internal or external market. It is thus clearer to name them all 'product'.

Defining the internal product portfolio

The product portfolio that DAS uses to scout ideas and keep up to date with their development, as mentioned in chapter two, got an update during this project. An external design agency called GriDD (GriDD, 2022) redesigned the portfolio to have much more functionality in monitoring and steering the product development process. This is a good new step in helping teams to organize and stimulate the development.

Through the installment of Digital Development, the use of the portfolio might seem like it has become redundant (because the whole development process will be done by DD). This is, however, not the case. Just as with the whole department changing roles from capacity to product function, I recommend to also change the function of the portfolio. This is already possible with its current version.

The first function of the portfolio is similar to the one it currently has: the gathering of ideas for digital products. This is important for DD to keep updating the product lineup and to not miss out on great new product ideas. To keep the portfolio neat and to allow structured overview of the ideas, I recommend that DD responds to every portfolio entry, organizes an intake meeting and decides if they will develop it further based on a short market potential research. Additionally, the portfolio could have a liking system where employees can like and comment on certain ideas. This is a first basis for rating the potential of ideas and creates engagement with the platform (Markos & Sridevi, 2010).

A second function the portfolio will fulfill is that of a communication channel to the rest of the organization. The portfolio can be used to keep the organization up to date with the digital transition and to be transparent about what Digital Development is doing. In this way, interested employees can always see what is going on with the development of a certain product. This creates engagement with the department as well (Markos & Sridevi, 2010).

Recommendations for fame

For increasing the recognizability and popularity of, and the engagement with the digital products outside of the organization, I recommend creating a brand for the new department and the products it puts out. I would suggest a partnership with a design studio that has experience with both the digital realm and brand design. An example of such a studio option is Fabrique (Fabrique - Strategic Digital Design, n.d.).

For increasing how well-known and popular the digital products are internally, I recommend hosting an organization-wide event that focusses on the different digital products that currently exist, on up-and-coming digital products and on the value that these products can bring. An important consideration in the organization of this event is that the engineers need to be taught how to work with the products, so interactivity is key.

Recommendations for expertise

An important basis for increasing necessary expertise is to consider the whole function shift and new department a learning experience for the organization. Being part of a learning process also is one of the characteristics of new product development (Takeuchi & Nonaka, 1986). This process is new, this function is new, and people need to get used to a new way of working.

To flatten the learning curve, I recommend hiring new talent for Digital Development that can both bring expertise in certain aspects of the development process, as well as teach current talent the necessary skills. To streamline this learning process, it is important that the new department has much of the necessary expertise in house. Working together with the capacity-based rest of the organization is of course possible, and even encouraged, but being able to function as a standalone unit could speed up the development process and the sales.

Additional recommendations

Besides the suggestions that will help overcome the main pain points in the function shift, I have some separate recommendations based on findings from my research of the current structure:

Administration of sales

The new way of working that DD will bring to the organization has to come with a matching administration and financial structure. The organization is already working on organizing this. As an example, I have constructed a possible payment structure for the digital products:

The PMCs are allowed to lease the digital products for a set amount. They will forward this payment to their customer. In this way, the PMC does not have to pay for the digital product but can add extra value by using it. For the customers of DPCs, the payment structure will be as with any other product: they will pay DD for the use of the product.

Communication with other PMCs

DD is located quite far away in the organizational chart from where the sales need to be done: in the PMCs. Will the communication between DD and the PMCs be good enough to realize the sales? This concern was voiced by both colleagues and DAS management.

One idea to combat this concern is to place DD closer to the PMCs (read: accommodate it in a business line, see Figure 13). This would mean that DD will be in closer contact with the PMC leaders and customers and thus know more about upcoming projects. However, it would also mean that every business line might need their own DD department (see Figure 14), and that the department is still not separate from the business lines (the function-mix remains). Having the department closer to the PMCs would also mean more influence on what DD needs to do, while it should operate on its own. Disagreements about, for example, the allocation of funds and time could arise and prohibit both the PMCs and DD from functioning properly.

Additionally, an argument could be made that the communication between the DD department and the DS department is just as important. They would be further apart if DD is brought under one of the business lines (see Figure 13). Multiple DD departments would make this even more difficult.

Nonetheless, with DD being separate from the PMCs, there needs to be good communication. I think this will, easily said, sort itself out. Every product has a manager who can be made responsible for contact with the business line or PMC leaders that could benefit from that specific product. Besides that, every product has a representative from the PMCs in place. As mentioned before, it is important to keep the inventor of the idea, the engineer, part of the team. This person is also up to date about what the product can do exactly and in which projects it could be useful. Communication via these two team member also works from the PMC to DD when there are, for example, concerns about the product or ideas for new products.

Selling the digital products

The aforementioned importance of communication focuses mostly on selling the Digital Products for Engineers. These are meant for internal sales. When W+B also starts developing more Digital Products for Customers, I recommend looking into the possibility of installing an in-house sales team into DD. This is a whole new area of expertise and could benefit from a dedicated sales team.

Key performance indicators

The new department needs a success measure to make sure that it, the products, and the people are performing as desired. It is thus very important to set Key Success Factors (Objectives) and Key Performance Indicators (Measures) for Digital Development according to the balanced scorecard (Kaplan & Norton, 1992).

Currently, W+B has only fiscal performance measures. This is closely related to the number of projects and how busy the employees are but says very little about the outcome of the projects. Because there are no other KPI's, it is difficult to say how well DAS is doing.

Digital Development could implement KPI's in a more startup like manner. The overall department still has to hold to the set KPI's of the whole organization, but within the department other KPI's could become more important as well. Employee and customer happiness, number of times a product is deployed and of course fiscal indicators, are all important.

For example, the balanced scorecard can help with organizing these indicators. The balanced scorecard is "a set of measures that gives top managers a fast but comprehensive view of the business." (Kaplan & Norton, 1992) This tool can help assess the new department as well as help with adjusting the strategies for the different digital products. The separate digital products could also implement their own balanced scorecard.

Reachability

A very simple recommendation is to make the digital products more reachable for external parties. Customers currently don't really know where to find information on the digital products or are not able to find the products at all. Competitors use dedicated headings on the main website that point to information about their digital transition and -products, for example (Arcadis – Nederland, 2022).

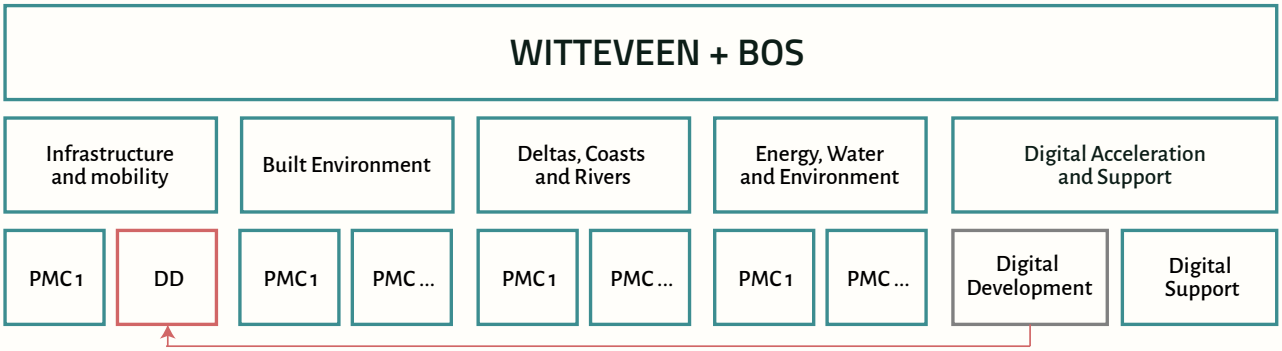

Figure 13 Accomodating DD under a business line and placing it further from Digital Support

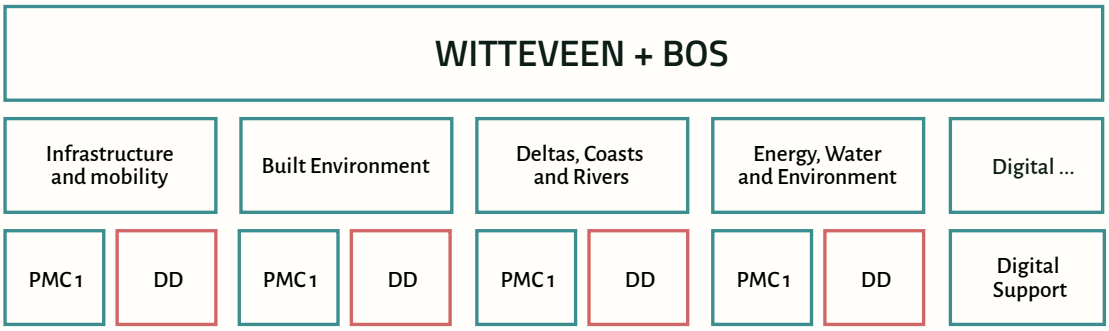

Figure 14 A separate DD department for every business line

CHAPTER 7 **DISCUSSION**


REG
ELIZABET

W+B is ready to start the marketing of its digital products. Based on the research of Simon (1989), this report showes that the organization needs a product function to successfully do this, which it currently doesn't have. The recommendation is therefore to create a new department with a product function, named Digital Development, to enable this desire.

Many difficulties, or pains, come to light analyzing the current process. These difficulties need special attention when conducting the function shift towards the new department. This report clusters these pains in four main points of attention: Prioritization, Vocabulary, Fame and Expertise. For all these main points, the report offers recommendations.

This report shows a case to which the theory of Simon (1989) is closely applicable. Simon explains the theory behind the afformentioned difficulties but does not dive deeper into how the proposed function shift can be conducted. A similar case to what this report studies, was studied by Smulders & Dorst (1997) and held similar conclusions but also mostly describes the change and does not show design implications. This report extends on these researches and shows how a local organizational function shift can be conducted in an organization that needs to shift towards a product function. The focus on design and on this specific case makes that the findings and recommendations of this report cannot be generalized for other cases. The PMC structure of the organization allowed for this intervention, but this might not work in all organizations. It is expected, however, that the four main pain points are applicable in similar situations at other organizations.

Thorough literature and organizational research lead to the design of a new department in this project, but other options to create the desired result might be possible. This concept is one possible intervention, more options exist. Future research within the company should explore what these possibilities are and how they can be implemented in the organization. Due to time restraints, this report does not explore these other possibilities. It should, however, be noted that this report does recommend multiple interventions, but they are all linked to the design of a new department.

The purpose of this project was to find a way for W+B to market their digital products. The concept of this local function shift that results in the design of a new department creates this opportunity. Although the real-life implications (and thus the success) of this intervention are yet to be tested by the actual implementation of this concept, litereature and similar strategies at competing organizatons (see Appendix 1) point to the success of this concept.

A possible topic for future research into shifting the strategic function of organizations is to find if a local function shift could be recommendable in more organizations. The PMC structure of W+B allowed for this, but other organizational structure might also be able to accommodate a product function in a capacity-based organization or vice versa. The question here is if a local function shift combats the continuity dangers of function-mix-borders in different organizations.

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Brief introduction of appendices

Adding onto the main findings in this report, these appendices offer some additional information as a background. The first appendix shows the similarities between the solutions proposed in this report, and how the main competitors of W+B tackle the same problems in their digital departments. The second appendix goes more into detail about the method used to gather the findings that this report is based on.

Appendix 1

Similarities in competition

Looking at the competition, we can see that separating a digital department to have a product function is not all too strange in the field of civil engineering. Let's consider main competitors Arcadis and Royal Haskoning DHV.

Like W+B, Arcadis and RHDHV both have separate platforms from their main website for promoting the digital transition and what they can do in the digital realm.

Arcadis' product platform shows six functional digital products. These can be bought and used as a standalone digital product. The platform that sells this is called 'Arcadis Gen' (a sort of Digitial Acceleration department). They also show what they are doing in their digital transition via a part on the site called 'Expedition DNA' (a sort of Digital Support).

RHDHV on the other hand promotes 4 'data & software solutions' that are also standalone digital products. Noteworthy is that both competitors do not promote digital additions to their analog services. W+B does this on their digital solutions website, only it's unclear due to the terminology used.

While being unsure about the structure of digital product development at RHDHV, Arcadis Gen is a full separate entity. It was created to help scale up the digital products that Arcadis puts out in a fast-changing digital landscape. They mention that due to the relationship between Arcadis and Arcadis Gen, they can offer customers great benefits through already existing and still to be developed digital products. This close to what I understand the vision for the digital side of W+B is.

A third competitor that was mentioned to me is Viktor. this is a platform to easily create applications for engineering. It partly does the job that Digital Acceleration also does for W+B. This is the reason that I do not see Viktor as a competitor, but as a potential future partner for the development of digital products for W+B.

Appendix 2

Process steps

In this appendix shows the steps and research methods I used to gather information, frame the problem and the solution space and generate ideas for recommendations. This is all according to the systemic design methodology presented in Chapter 1.

Immersion and inquiry: Interviews

In the case of this project, this inquiry was done by qualitative interviews with people from the DAS team and current product owners.

A series of both structured and unstructured interviews provided me with notes and information that, together, explain the context, the problem and the scope of this project.

To not miss out on any important information, I made audio recordings of every interview. During the interviews I listened and asked follow-up questions, and after the interview I made my notes and gathered conclusions and insights.

Besides gathering information from interviews, I also read through multiple documents that were provided to me by the team and by my supervisor. These documents were for example:

- A report on the current status of the digital transition
- A plan of attack for the +Plus goes to market program
- The plan for the spearhead 'Marketing digital value'
- A cost and profit analysis of the digital transition thus far
- A goals and efforts diagram for the digital transition
- Brainstorm notes about the future of the DAS sector

Framing the problem space: Mapping

To make sense of all the information that was gathered during the interviews and by reading the documentation, I started mapping all information in three different maps:

1) A connection map (similar to what is known as a stakeholder map)
2) A process map of the current and desired development process.
3) A challenge map that holds the identified challenges in reaching the desired state.

The maps together create sort of a challenge landscape that describes what is going on with the digital product development within W+B. The maps also helped with discussing this landscape with fellow students and for myself to understand better what is going on. This is to me one of the more efficient ways to gain insights and a better view on this project. I discussed the whole problem landscape with three fellow industrial design students. This helped greatly in framing the problem and giving words to it.

These maps were mainly used as guide to research and frame the problem space. They have since changed too much to make sense in this report.

Framing the solution space: Clustering challenges

The challenge map described in the previous part initially contained a lot of smaller challenges. These were later clustered into the four main pains described in Chapter 5.

Generation and implementation: Creative sessions

I organized two brainstorm sessions, to find out if the creation of DD would work to solve the problems described in part two and to see what implications and details go along with a change like this. One session was with fellow design students and one session was with colleagues from DAS. These sessions are described below. Both sessions were hosted online for the convenience of the participants. I recorded them for reference with approval of all participants.

Session 1

Name	Outside perspective
Audience	2 fellow SPD students
Duration	1 hour
Setup	Online zoom meeting: Prepared collaborative Miro board with 5 creative exercises and 2 short presentations
Goal	Get feedback on the idea/concept from an outside design perspective

This first session was an open brainstorming session. It was prepared with questions and explanations about the project (since both students had no prior knowledge of the content of my project). The flow of the brainstorming was as follows:

This flow worked well because the students were used to participating in these kinds of brainstorms, but it was not naturally flowing. What missed was the explanation of nuances in the problem (I needed to explain this along the way). The questions and goals were too broad as well. Specifying this would make for a more fruitful session, I believe. However, there were some interesting conclusions.

Conclusion 1.1: The terminology around digital products is not yet clear enough
Conclusion 1.2: A new department needs a good employee strategy
Conclusion 1.3: The organizational structure is not suited for creating products
Conclusion 1.4: The department and the PMCs need to communicate well
Conclusion 1.5: The value the PMCs get out of the products is unclear

The entire Miro board can be found via https://miro.com/app/board/uXjVOtWCTdg=/?share_link_id=412096147159 .

Session 2

Name	Inside perspective
Audience	7 DAS colleagues
Duration	1 hour
Setup	Online Teams meeting: Prepared collaborative Miro board with 9 creative exercises and 2 short presentations
Goal	Test the concept with colleagues, discuss the details and create ownership through cooperation.

With the learnings of the first session, this second session was prepared better. This was also necessary because the participants were not (all) used to this kind of brainstorming session. I also included two exercises to create the right mindset in the participants

- One to make participants observant of everything they saw and heard and to get used to writing on post-its
- The other one is to introduce the concept of 'How can you'(HCY) and to create an open mindset).

The context of the problem did not have to be explained, so I dove into testing my concept's feasibility. The flow for this session was as follows:

This session worked better due to the introductory questions and because the context was already known. Still, there were some difficulties for the participants in understanding what I was planning to do. This also had to do with me not wanting to impose my plans too much on them to allow for future changes. These difficulties resulted in me skipping one exercise, but this was not a very important one. Conclusions from this session were:

Conclusion 2.1: The department centralizes knowledge about product development
Conclusion 2.2: Developing digital products asks for technical knowledge that might not be present in a separate department

Conclusion 2.3: The new department should be able to communicate very closely with the PMCs
Conclusion 2.4: De definitions for digital products are not yet sharp enough
Conclusion 2.5: The new department should be able to host and maintain the products themselves

In this session, the participants also worked on possible financial structures, team composition and naming of the new department. More about this later. The full Miro board for this session can be found via: https://miro.com/app/board/uXjVOrkVH2Y=/?share_link_id=138514381201.

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Nieuwenhuijse
initials: MJ given name: Martijn
student number:
street & no.:
zipcode & city:
country: Netherlands
phone:
email:

Your master programme (only select the options that apply to you):

IDE master(s): ( ) IPD ( ) DfI (★) SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: ( ) Medisign
( ) Tech. in Sustainable Design
( ) Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: Ena Voûte dept. / section: Dean
** mentor: Frido Smulders dept. / section: DOS-MOD
2nd mentor: Otto Schepers
organisation: Witteveen+Bos
city: Amsterdam country: Netherlands

comments (optional)

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair _____ date ____-____-____ signature _____

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: _____ EC

Of which, taking the conditional requirements into account, can be part of the exam programme _____ EC

List of electives obtained before the third semester without approval of the BoE

★ YES all 1st year master courses passed

NO missing 1st year master courses are:

name _____ date ____-____-____ signature _____

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: ○ APPROVED ○ NOT APPROVED

Procedure: ○ APPROVED ○ NOT APPROVED

comments

name _____ date ____-____-____ signature _____

Initials & Name MJ Nieuwenhuijse Student number _____

Title of Project Streamlining and monetizing the DP development process at W+B

Streamlining and monetizing the DP development process at W+B

project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 06 - 04 - 2022

20 - 10 - 2022 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Note: the title contains two abbreviations that mean the following: Digital product (DP) & Witteveen+Bos (W+B).

Since 1946, Witteveen+Bos has been one of the leading names when it comes to providing engineers and advisors for complex problems regarding the built environment; delta's, coasts & rivers; energy, water & environmental issues and infrastructure & mobility. From 11 different countries, but concentrated in the Netherlands, almost 1400 engineers are working on improving society within these four terrains. The almost 4.000 challenges these engineers solve each year are mostly issued by stakeholders like local governments and top sector companies.

Every year, W+B creates a set of new goals to keep innovating their processes and company structure, as well as give their employees the opportunity to keep growing. Engineering is the work of people, as they say. Throughout their processes there is also a focus on keeping a sustainable mindset in everything they do.

Due to the amount of projects that W+B does, it is in the interest of both the company and the engineers that the engineers design solutions to automate parts of their work. These automations can be used to save time in designing and calculating solutions. They can also help increase the value that is given to clients. When a certain programmed automation works with more clients, the idea of creating a digital product, that can be sold to clients and used in more projects, is born.

These digital automations and tools are being converted to digital products with the help of the Digital Acceleration and Support sector of the company, lead by Otto Schepers. These products get their own product owner to manage it and are brought back to the engineers that designed it to be developed further and kept up to date.

Currently there are 21 ready to use digital products that are being showcased on digitalsolutions.witteveenbos.com. Among these 21 are products like a tool that calculates the movement of waves in a harbour, a VR application that shows the changes to a landscape that a new dyke makes or monitor that visualises bicycle traffic.

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introduction (continued): space for images

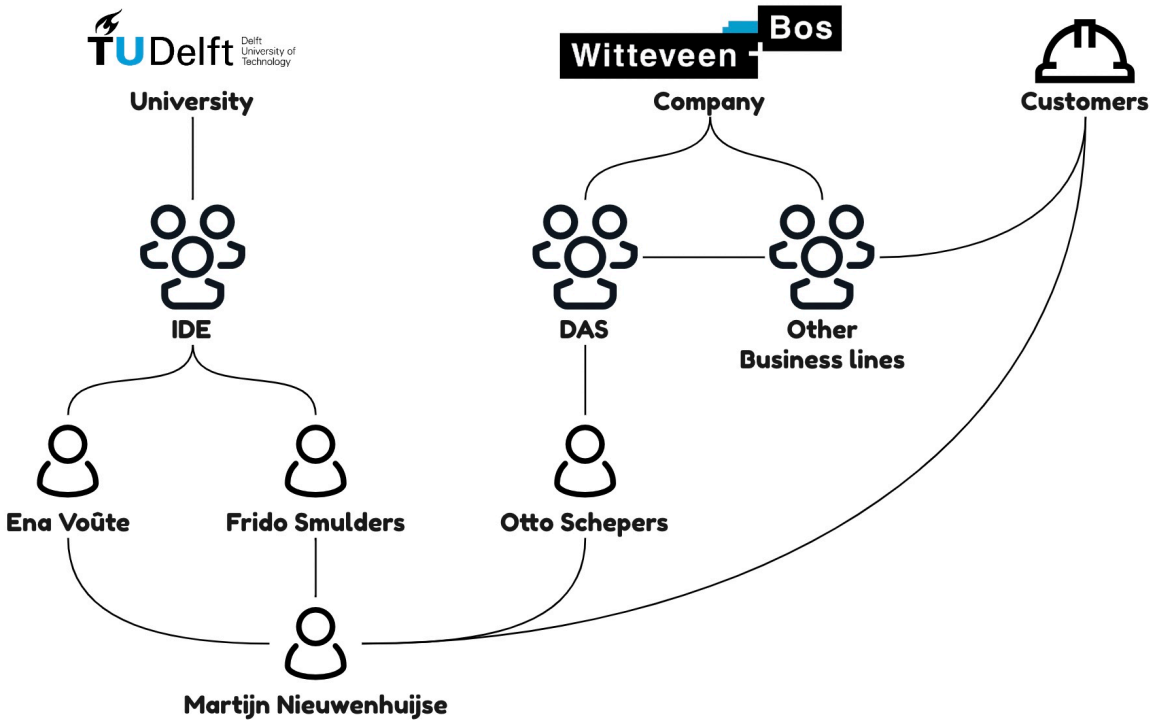

image / figure 1: Quick Stakeholder/User Overview (in progress)

TO PLACE YOUR IMAGE IN THIS AREA:

- **SAVE THIS DOCUMENT TO YOUR COMPUTER AND OPEN IT IN ADOBE READER**
- **CLICK AREA TO PLACE IMAGE / FIGURE**

PLEASE NOTE:

- **IMAGE WILL SCALE TO FIT AUTOMATICALLY**
- **NATIVE IMAGE RATIO IS 16:10**
- **IF YOU EXPERIENCE PROBLEMS IN UPLOADING, COVERT IMAGE TO PDF AND TRY AGAIN**

image / figure 2:

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

For this assignment I want to focus on two main problems that Witteveen+Bos is currently dealing within the boundaries of their company goal: 'Economical value'.

Firstly, the process of scaling designed automations to digital products is not streamlined and often goes wrong which results in a lot of digital products being lost. This happens partly due to a lack of knowledge about product creation, marketing and value proposition which makes the product either unpopular among clients, or not salable. Another problem here is the ownership of the product and poor time management around it's development.

Secondly, the automations that make the basis for these digital products are great time savers that cost a lot of time to develop. This is in the basis not a problem, but due to the business model of paying-per-hour-worked ('uurtje factuurtje') this makes for a highly uneconomical system. Something the goal 'Economical value' tries to counter. The digital products need a business model that fits the general business model of W+B, which is rarely created. Engineers that develop the product sometimes fill in a canvas, but not tailored to the product itself.

The Digital Acceleration sector is already working on developing certain digital products as well as creating tools to help engineers with this development but an overarching process and a guidance system to increase the strength and amount of digital product implementations the is not yet specified.

These problems overlap to result in one assignment.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

I will research the streamlining and economization of the digital product development process at Witteveen+Bos. In addition to this, I will use a systemic design approach to create an overarching process to increase the strength, amount and economical value of these digital products.

Due to the complexity of this problem and the general increasing amount of complex design problems (1), I believe that researching and using a systemic design approach is valuable for both the client company as well as the faculty of industrial design.

The expected outcome of this project is a methodical approach to the development of digital products within Witteveen+Bos. This might result in the design of a ready to implement toolkit or a roadmap towards organizational change in order to stimulate this. In any case, the project will focus on finding an easy-to-understand and easy-to-implement solution for all stakeholders (see figure 1).

Initials & Name MJ Nieuwenhuijse Student number

Title of Project Streamlining and monetizing the DP development process at W+B

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 6 - 4 - 2022 20 - 10 - 2022 end date

The planning consists of two main stages. In the first stage (Defining the problem space) I will work on getting a good idea of the problem behind the problem, the available methodology to solve these problems and a first idea of how to actually solve the problems. This will be done through interviews, competitor analysis and the use of experts. This first stage will go through a couple of cycles of diverging and converging to find all neccesary information but also to specify a design direction for stage two. The seconds stage (Defining the solution space) is about designing the final product of this thesis. This iterative stage will be about creating and testing a final solution. Throughout the planning there are repeating events such as meetings and presentations.

To keep my project organized, I have already created a mail and file structure. In addition I want to communicate weekly updates about my project to all supervisors and other important stakeholders through the use of a blog. This will also make keeping an overview on my project easier and documented as well as stimulate weekly reflection.

The planning also includes vacation time and consists of 21 weeks to accommodate for holidays like Easter and ascension day. Alongside graduation, I want to follow SPD Media to force myself to focus on visualization of my project (a part I usually don't take enough time for) and to get a grade that allows me to potentially graduate cum laude.

For the planning, visit this link:
https://docs.google.com/spreadsheets/d/18eL4zMDr4Q5Ai8sszLe8HH2CHMf20Nau/edit?usp=sharing&ouid=114682206000226092904&rtpof=true&sd=true

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

In my search for a project, I eventually had the luxury of choice. I chose to follow this assignment because I felt that Witteveen+Bos needs an organizational change to solve this problem. I practiced with this in both the courses DSP as well as CEDIE where I both really enjoyed this process. What also interested me is the fact that W+B is not an industrial design focused company, but a civil engineering consultancy. To incorporate design thinking in an assignment focused on organizational change in a company that is not used to this, I feel I could make some real and positive impact.

Throughout my studies I have done both study related and non-study related activities that have taught me a few competences that I want to use in this project:
- The design of processes is something that I highly enjoy. Using design thinking to create a process or structure of some sort of organizational change that helps to solve the problem without needing a physical product.
- A structured working approach has been a necessity for much of my work and something that satisfies me. This means thorough planning, organizing documents and documenting everything.
- Involving many parties in a design process and knowing how to talk with them is to me one of the most important skills I have learned. Stakeholder management.
- Pitching information is both a passion of mine as well as a useful skill.

These are, in my opinion, useful competences for a graduation project, but what I still want to learn in this project is:
- In addition to stakeholder management I want to learn a certain humility in that process that teaches me that it's not about my project or my result, but what the project and the results really mean for the user.
- I have been working at Witteveen+Bos now for a week and I have realized that I don't yet really know how to move through a corporate environment.

Besides a few points of competences I want to learn, I also have a few ambitions for this project:
- I have heard and read about systemic design, but it's something I know hardly anything about yet. Being a combination between systems thinking and design thinking, it sounds like it's something I could really get in to. I want to take a deep dive into what systemic design means, how it's used and what it's really for, and see if I can use it in my project.
- I like to work from a good basis of information. Throughout my studies I have learned to do research and extract information in multiple ways, but I want to learn more about this. People know so much useful things that we can use to design better.
- I really like giving presentations. Through many courses and final presentations for project I have learned what works and what does not work in pitching information. Now I want to see if I can use this knowledge to help my project forward. Besides this, a goal of mine is to give a banging final presentation about this project.
- I write a lot of words for sometimes very little information. This is fun to do and sometimes also fun to read, but not always efficient and useful.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

References:
1) https://www.accenture.com/nl-en/blogs/insights/what-can-the-brain-teach-us-about-complex-problem-solving
2) Ryan, Alex J. (2014) "A Framework for Systemic Design." Retrieved from: https://journals.oslomet.no/index.php/formakademisk/article/view/787

Initials & Name MJ Nieuwenhuijse Student number

Title of Project Streamlining and monetizing the DP development process at W+B

GRADUATION REPORT

—

MARTIJN NIEUWENHUIJSE

—

STRATEGIC PRODUCT DESIGN
DELFT UNIVERSITY OF TECHNOLOGY

—

OCTOBER 2022