Developing design capabilities in a software SME

Graduation thesis - Sjoerd Bastiaansen

Graduation Thesis
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Preface

Dear reader,

This report describes the results of my graduation project. Over the course of 6 months, I have been active as a 'Design Innovation Catalyst' at CM in Breda. In this role, I have supported CM in exploring how it can increase its design capabilities in order to make even more successful products.

This report is built up in a number of chapters. Chapter 1 introduces the research context and objectives. The chapter that follows, chapter 2, describes an overview of academic thought on different aspects of the research context.

Chapters 3 until 7 provide the research body. After introducing CM more in depth, an exploration of the initial state of design capabilities at CM is described, along with proposals to start building these. Chapter 5 then describes how I translated these proposals into actions. At the end of my presence in the company, I evaluated the impact I had and the change that occurred at CM. Chapter 6 describes this investigation and chapter 7 reflects on the findings.

The main conclusions are described in chapter 8, along with recommendations for the company, future design innovation catalysts and future research.

I am very proud of the impact I have had in the company and hope this report reflects that. However, this would not have been possible without the people at CM and Tjeerd Machielsen in particular, for always being there to answer my questions, reading my work, and helping me navigate the company from the first to the last day.

Furthermore, I would like to thank Pascalle Govers and Rebecca Price for all of their advice, recommended readings, and the deserved wake-up calls when necessary. A final word of thanks is dedicated to friends, family, and Anouk, for their unconditional support and encouragement to be the best version of myself.

Delft,
October 6, 2017

Executive summary

This report describes the research executed to determine the impact of the contribution of a Design Innovation Catalyst (DIC) on the development design capabilities in a software SME. The company involved in this research is CM, a Dutch company that provides connectivity solutions in a business-to-business market.

Prior to the research, CM had engaged in a company-wide branding exercise, which led to a redefined brand story and visual identity. To follow-up on this, the company expressed interest to further develop its design capabilities. To explore this, CM hired the author as a DIC who, during a six-month period, was embedded in the organization to help CM build design capabilities.

To do so, the DIC first explored the company's culture and attitudes, in order to discover the barriers to the development of design capabilities. The barriers identified included a self-referential approach to product development, a low urgency to change practices, and low design capacity.

Based on this outcome, the catalyst defined two first steps to develop design capabilities:
- Engaging with users to inspire the NPD process, and
- develop a broader understanding of products.

To do so, the DIC worked together with product development teams through an array of workshops to build hands-on experience in using design methods, and in parallel, the catalyst engaged with managerial stakeholders within CM to increase their understanding of design's added value and receive endorsement for his activities.

In the final weeks of the DIC's presence at CM he investigated the effect his presence had on the behaviour and attitudes of CM's employees. He found that the perceptions had shifted from design as a downstream tool for styling, towards design as a structured process of investigating and exploiting new opportunities.

Next to shifts in perceptions, the DIC also found that individuals at CM also started to incorporate design tools in their daily work and that the company itself hired additional design professionals as a result of his work.

Although this shift isn't visible in the entire company, the findings suggest that this will happen if CM maintains the momentum created by the catalyst. Therefore, the DIC concluded his presence at CM was a success. Especially given the relatively short period of engagement compared to other studies involving DICs.

The catalyst described three approaches as critical to his success in developing design capabilities:

- Starting with a thorough exploration of the company's culture, strengths, and weaknesses.
- Combining a top-down and bottom-up approach.
- Combining group- and personal engagements.

The catalyst suggests future scholars to investigate the long-term effects of design-innovation catalysts and develop an overview of the barriers towards developing design capabilities in companies across industries.

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Glossary

Action research

A research strategy in which the researcher is actively involved in the research and builds best practices by iterating between learning from observations to refine actions.

Agile (development)

A product development approach common to software development. The method uses an iterative approach to development, working in short cycles to allow for incremental product improvements.

Application Programming Interface (API)

A piece of software that third-party software developers can embed into their software to remotely use other applications.

Barrier (to adoption of design capabilities)

An organizational trait that prevents the organization from adopting or developing design capabilities.

Design activities

Activities that relate to the development, improvement, or innovation of products, services, systems, and experiences.

Design capabilities

The availability of knowledge and experience required to be able to perform design activities.

Design capacity

The availability of people that can perform design activities, generally these are design professionals.

Design Champion

A company employee who supports the design catalysts in the day-to-day politics of the organization as well as providing assistance in communicating research findings in the organization (Wrigley, 2016)

Design Innovation Catalyst

A design professional who bridges the gap between the design practice and business, to support companies in adopting design practices.

Design toolkit

An array of tools and methods to facilitate design activities.

MBA

Master of Business Administration; A degree programme that focusses on building a student's management skills.

SME

A Small to Medium-sized enterprise.

S&P500

Standard & Poor's 500, a stock index that lists the stock of the 500 largest U.S. companies.

1. Introduction

This section introduces the research context. It first describes what led CM to employ a Design Innovation Catalyst (DIC), after which it describes the research questions and significance. It finishes by briefly describing the report's structure.

1.1 Background

The research investigated the effects a Design Innovation Catalyst (DIC) had on the development of design capabilities in a company. The research was conducted at CM, a Dutch company that provides connectivity solutions in a business-to-business (B2B) context. CM was founded in 1999. The company's initial business was sending text messages for their clients in the entertainment and hospitality industry in order to support their marketing efforts.

Since its founding, CM grew substantially and at the time of the research employed just over 250 employees in 7 countries in Europe and the Asia-Pacific region. CM grew through a strategy of portfolio expansion, international presence through local offices, and mergers and acquisitions. CM argued that its success is not only built on a range of high quality products, but also on the way they approach the market.

CM described that this approach stemmed from their unique company culture and a strong vision for the future. Recent growth led to CM feeling the need to translate the largely unarticulated values underpinning this culture to a strong brand proposition. This exercise to explore the company's core values, vision on the future, and raison d'etre was conducted in 2016.

The activity resulted in an expansive brand identity story, which in turn became the foundation for a transformation of the visual identity, which included a new website, new logos, and a redefinition of the product portfolio.

This act can be seen as a first step in a transformation from a company that sells technical products towards an established brand that is perceived as a reliable partner all over the world. That transformation is a part of the larger ambition expressed by CM to become the world's "most human high-tech firm".

In order to take next steps in this transformation and the realization of this ambition, CM expressed interest to explore the potential benefits further investments in design capabilities could bring.

To explore this potential, CM hired the author as a Design Innovation Catalyst (DIC). During a six-month period, the author was embedded in the organization where he aimed to support the organization build design capabilities.

1.2 Opportunity to build design capabilities

Building design capabilities creates substantial added benefits for companies. Design capabilities support firms in the discovery of new opportunities, the development of new value propositions, and in improving product experiences. Design capabilities create this added benefit in ten different categories, including improved customer experiences and satisfaction (Lockwood, 2007).

The Design Value Index (DVI) substantiates this argument, showing firms considered as 'design centric' to outperform the S&P500 index by over 200% over a 10-year period (Rae, 2013).

Not only multinational corporations benefit from investments in design capabilities; small- to medium sized enterprises (SMEs) also benefit from investments in their design capabilities. SMEs investing in their design capabilities can expect a return on investment of up to £20 per single pound invested (Design Council, 2012).

Despite growing evidence that investing in design capabilities creates substantial returns, not all companies invest in their design capabilities. Nearly half (43%) of SMEs in the United Kingdom were found not investing in their design capabilities (Ward, Runcie, & Morris, 2009). Although this number is relatively low, it does not mean firms have no interest in design. Many firms are willing to explore potential benefits through small-scale design projects, but these are often not followed by substantial investments (Brazier, 2004), for a number of reasons:

- Design is often associated with the aesthetic qualities of products (Brown & Martin, 2015; European Commission, 2009), rather than a practice that integrates knowledge from various disciplines for the purpose of developing products, services, and systems (European Commission, 2009).
- Design capabilities are perceived to be a luxury and only of value to large multinational corporations (Brazier, 2004).
- SMEs often look to hire specialists, whereas designers often operate from a more generalist perspective. As a result, SMEs find themselves having difficulties in understanding how a designer can bring added value to their operation (Gulari, Fairburn, & Malins, 2013).
- Design professionals often lack skills and knowledge to cooperate with business management, making it difficult to convey their added benefit to mangers. This hinders a successful integration in organizations (European Commission, 2009; Lockwood, 2007).

If a company manages to embed design capabilities into its organizational practice, it can reap substantial added benefits. To overcome the described barriers, the design catalyst must also help the organization build a complete understanding of what design entails.

1.3 Research questions & objectives

Within the overarching ambition to support CM developing and embedding design capabilities as part of their competitive strategy, the research sought to produce best practices on building design capabilities. It does so by answering the following research question:

> *RQ: How can a design innovation atalyst support the development of design capabilities in a software SME?*

To do so, the DIC followed an action research approach. Action research is a research strategy that serves to solve practical problems and produce guidelines for best practices (Denscombe, 2010). In action research, a researcher is actively involved in the research process and continuously reflects on his findings in

order to shape his actions. In other words, action research means learning by doing, and doing based on learning.

Because deciding on the tools and methods most suitable to CM required knowledge on the company and barriers to the adoption design practices that existed in the company, the DIC started by developing an understanding of the initial state of design capabilities in the organization.

> *SRQ[1]: What barriers to the development of design capabilities exist in the investigated company?*

Based on the findings, the catalyst proposed first steps for the company to take to develop and embed design practices. The action-research approach meant the DIC actively engaged in activities with employees to facilitate the embedding of design activities in the company culture.

At the end of the catalyst's tenure, he evaluated the impact of his presence on both the attitudes and behaviours of individuals in CM. This approach helped to answer the second sub-research question, formulated below.

> *SRQ[2]: How have the perceptions of design practices shifted as a result of the interactions with the design catalyst?*

The catalyst expected a shift in perception of the design practice to happen in CM, as this is generally a first indicator of change in a firm (Doherty, 2014).

1.4 Significance

The research aimed to build design capabilities in a software SME by having a DIC embedded in the organization. Through the described research questions, the research created knowledge on barriers that exist in CM and how a DIC can develop design capabilities in an organization.

This knowledge adds to a growing knowledge base on the development of design capabilities across different industries. Industries that have previously been explored in this context include non-profit organizations (Nusem, Wrigley, & Matthews, 2017), professional services firms (Howard, 2012), manufacturing companies (Doherty, 2014), family-led businesses (Pozzey, 2012), and the utilities industry (Stevenson, 2016).

This research contributes to this knowledge base because it investigates a previously unexplored industry, namely that of software development. Furthermore, previous studies have focussed on Australian organizations, whereas this research investigated a Dutch company.

It should subsequently be noted that for a number of previous studies the development of design capabilities originated from necessity. The companies investigated felt their market position pressured by the competition. This research was initiated from a more exploratory perspective. CM wanted to explore the possibilities, rather than explicitly seek new ways to create a competitive advantage.

1.5 Thesis structure

The report follows the same structure as the research. Table 1 provides a brief description of each chapter's contents.

First, existing literature on design capabilities and software development is described. After this, the participating company is described more in depth, by addressing CM'ss background, current practices and products, and its market context.

Following this introduction, the report presents the first part of the research, in which the barriers to the development of design capabilities that initially existed in the company were explored.

The report then describes the first steps proposed to overcome these barriers and develop design capabilities.

The report continues by describing the catalyst's actions to support the company building design capabilities, after which the report seeks to answer the second research question. It does so by exploring the shift in perceptions of design practices after a six-month intervention by the design catalyst.

The report concludes with recommendations for CM and proposes directions for future research.

Chapter	*Contents*
1	A background of the research, along with the research goals and significance.
2	An overview of the existing literature regarding the research context.
3	A more detailed description of the company, including core values and market position
4	The approach and outcomes of the catalyst's exploration of the company.
5	The catalyst's actions in order to support CM in building design capabilities.
6	The approach and outcomes of the catalyst's evaluation of his impact on CM.
7	A reflection on the effect the catalyst had on the organization.
8	Conclusions of the research, along with recommendations for the company, future DICs and future research.

Table 1: Overview of report contents

2. Literature review

This chapter introduces the literature relevant to the research context. It first defines design capabilities, after which it discusses why design capabilities are relevant for businesses. It then introduces the challenges that exist in the integration of design practices in the industry context. The chapter ends by describing why a DIC is relevant to the context.

2.1 Design capabilities

The definition of design, and moreover design capabilities is ambiguous. As a result, various definitions are likely to exist between individuals (European Commission, 2009).

The differences that exist between individuals are understandable, as David Kelley, founder of IDEO and dean of Stanford's D.School, notes "Fashion designers say they design, and people who design airplanes say they design, but they are quite different people." (Camacho, 2016).

An important cause for these differences is the existence of two streams of design existing at the base of the design practice. One stream relates design more to an inclusive approach, linking design closely to arts and crafts, whereas the other is a more polytechnic approach, that interacts with architecture and engineering, called industrial design (Braga, 2016).

A common theme in these definitions is often the idea that design concerns the aesthetic qualities of products, considering design a downstream styling tool concerned mostly with the translating a technological innovation (Brown, 2008).

Design activities should rather be seen as a set of tools that support design as *"a strategic problem-solving process that drives innovation, builds business success, and leads to a better quality of life through innovative products, systems, services, and experiences"* (World Design Organization, 2017).

This definition of design is also reflected in the design thinking framework, describing design as a process of integrating people's needs with technological feasibility into a commercially viable value proposition (Brown, 2008)

Looking from this perspective, design can serve more purposes than simply translating technological innovations into aesthetically pleasing products. Nusem, Wrigley, & Matthews (2017) defined four objectives for design in business (figure 1). The applications discerned in this grid are:

- **Solution-centred design:** Design is applied to solve a problem through a product or service.
- **Design for competitiveness:** Design is used to help the company innovate and create a competitive advantage
- **Social-Centred design:** Design is used to have a social impact through a product or service.
- **Design for the greater good:** Design is used to drive strategy or policy to ensue social outcomes.

Therefore, design capabilities should be seen as the ability to perform activities that relate to achieving the outcomes described by the World Design Organization.

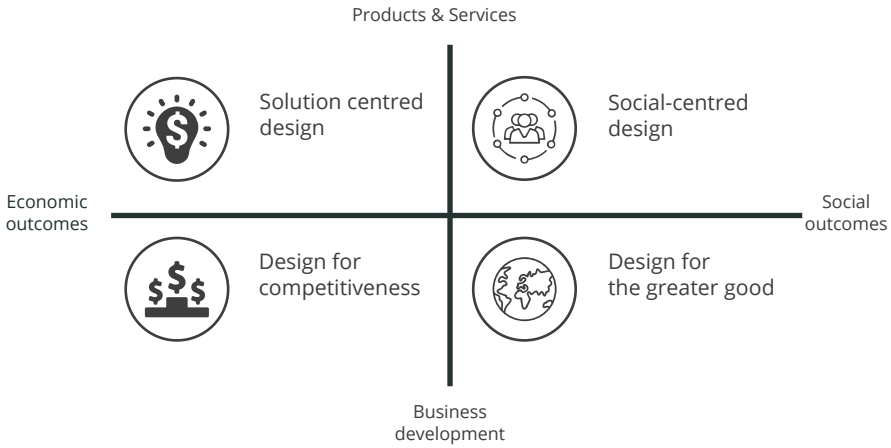


Figure 1: 4 objectives of design in business, adapted from Nusem et al. (2017)

2.2 Design and business performance

The value of design capabilities to companies has only received widespread attention since the early 2000's. Brazier (2004) was amongst the first to argue for the added value to SMEs created by the development of design capabilities. Brazier notes design capabilities aid firms in improving communications, product development, and innovation. Lockwood (2007) built on this knowledge and aimed to make the ways design capabilities aid firms more concrete. He argues design adds value to firms in ten categories. These categories include enabling strategy, improving brand image, and improving usability.

Design activities complement traditional innovation activities like fundamental research. This makes design capabilities especially relevant since the economic climate in Europe has made these traditional activities costly (European Commission, 2009). Additionally, Nevado, Barata, & Almendra (2106) conclude companies that show a stronger growth, often have design practices applied from an early stage in the product development process.

Recently, efforts have been made to quantify the value design creates to companies. The Design Management Institute developed the Design Value Index (DVI) (Rae, 2013), which compares the stock-price performance of design centric organizations to the S&P500 index over a ten-year period. The first outperformed the latter by over 200%. The DVI's inclusion criteria underline that to be considered design centric, firms must have design embedded in the organization. This includes having design must be involved in many processes organization and having design hold a stake in the firm's management, for example through a chief design- or chief innovation officer (Rae, 2016). Global electronics firm Philips for example, found it wasn't until design became embedded in the organization that it saw a return on investment despite winning numerous prestigious design awards. Earlier the design department had existed as a service to business units (Gardien & Gilsing, 2013).

Apart from the aforementioned electronics firm Philips, other corporations like Johnson & Johnson, Pepsico, and IBM increasingly value design as a strategic business resource (Muratovski, 2015). Muratovski further reports that a substantial number of corporations have been appointing designers to their executive levels. Most notable examples of this trend include Jonathan Ive (Apple), David Butler (Coca Cola), and Mark Parker (Nike).
Additionally, design has been found to have a considerable effect on the performance of SMEs. The added value for SMEs has been quantified through a nationwide study that found that for every £1 invested in design capabilities, SMEs can expect increased revenues of up to £20, and up to £4 in increased profits (UK Design Council, 2012).

Further evidence to suggest the success of design innovation efforts in SMEs is provided by Matthews & Bucolo (2013), who examined outcomes from design innovation programmes to support SMEs in two firms and found that the firms investigated experienced design to be beneficial for them as it supported growth. This growth was a result of an improved alignment between the company's products and user needs, as well as a better fit between the company's products and strategy.

2.3 Challenges in integrating design practices in software development

Since the computer made its way into people's homes in the early 1980's, the way humans interact with computers has received wide-scale attention from a range of disciplines, including design. Initially, this field of research was often referred to as Human-Computer-Interaction (HCI), today the application of design in software development is often referred to as User Interface- (UI) or User Experience (UX) design.

As connectivity is becoming ubiquitous and increasingly large parts of people's lives exist in digital realms, an increasing number of companies are moving to implement UX design as a competency. To do so, firms use a wide array of design tools to execute UX design. These tools include customer journeys, prototyping, and usability testing (Øvad & Larsen, 2015). Øvad & Larsen also found involving software development professionals in UX-related activities could contribute to the integration between design and software development. Activities found to be valuable contributions were developing redesign proposals (Bruun, Jensen, Skov, & Stage, 2014) and the execution of A/B-tests. (Øvad, Bornoe, Larsen, & Stage, 2016)Although Bruun et al. (2014) found that software development professionals can develop details of redesign proposals, given they are supported by a usability specialist, integrating UX design into agile development methods is often difficult (Plonka, Sharp, Gregory, & Taylor, 2014).

An important factor in this is that many agile-driven development methods are developed mostly to suit software development professionals, without considering input from external sources (Lárusdóttir, Cajander, Erlingsdottir, Lind, & Gulliksen, 2016). As a result, many agile development methods often do not explicitly

discuss user experience (Bordin & De Angelini, 2016). This leads to designers and software developers having different views and ambitions throughout the product development process. One of these differences entails the envisioned level of detail the designs produced, as developers often considered initial designs unnecessarily detailed. (Plonka et al., 2014).

Another challenge found was that projects often became development-led once the development team was running well, making team members involved in user research feel less productive. One way to overcome this is by carrying out field studies before the development work is being done (Muñoz, Helander, de Gooijer, & Ralph, 2016). This approach prevents difficulties when having to make changes based on findings.

The same study also found design professionals rebrand their activities to be deemed relevant by developers. This indicates the urge to involve users is low for many product development teams and as a result, the user's needs may be overlooked. This practice is also visible in larger software firms that market themselves as having a good user-experience, but where "surprisingly few have adopted usability methods and successfully incorporated these into development practices." (Lárusdóttir et al., 2016). This is ra relevant challenge, especially in business-to-business firms, where the customer paying for the system is generally not the product's end-user.

Overall, companies bringing user-centred design approaches into the realm of software development face a number of big challenges to overcome. However, if a company manages to overcome these challenges, it can make complex technologies more human-centred, and therefore easier to understand by users. This creates a competitive advantage in a volatile market. Therefore, overcoming these challenges is very much worthwhile (Cockton, 2016).

2.4 Design Innovation Catalyst

The increasing awareness of the value design capabilities have for organizations is also reflected in the attention to design thinking skills in MBA programmes. The courses generally teach business professionals to solve business problems from a customer-centric perspective and see the added value of the design professional in the organization.

However, these courses often don't teach the skills needed to inspire organizations to build design capabilities. This creates an opportunity for design professionals to take up this role (Wrigley & 2016).

The Design Innovation Catalyst (DIC), represents this new role for the design professional (Wrigley & Bucolo, 2012). The role of a DIC is largely similar to the translational engineer, serving as a bridge between academia and business practice (Norman, 2010).

At the base of the DICs work lies their ability not only to bridge the gap between research and practice, but also to move between a learning and teaching position (Wrigley, 2016). This forces the DIC to continuously digest and reflect upon findings in the organization and academia, to inspire his output both in academia and in organization learnings.

To do so, the DIC should possess twelve core capabilities listed by Wrigley & Bucolo (2012). This includes capabilities strongly linked to the design profession such as creative problem solving- and visualisation skills, but it also includes capabilities less associated with the traditional definition of the design profession such as business knowledge and the ability to challenge fundamental problems assumed by firms.

As awareness grows of design's value as an agent for social change, the design practice will also become increasingly relevant to governments (Muratovski, 2015). Together with the increasing need for specialist design teams in both small and large firms, the relevance of the DIC can be expected to grow along with these developments.

Recent work by DICs has provided knowledge on the challenges faced in organizations. Despite the studies being conducted across various industries, similarities in challenges are found. For example, both Pozzey (2012) and Doherty (2014) argue a good working relationship with operational teams is crucial to the chances of success.

Other important notions made by DICs are that it is valuable to maintain an outsider perspective of the organization and the importance of first building an understanding of the initial state of the organization's design capabilities.

Consequently, the role of a DIC represents a promising new field of application for the design professional (Price & Straker, 2017). However, this field is relatively new to both the professional and the academic world, which means it faces challenges that come with newness, one of which is misinterpretation by the business context in which they operate (Doherty, 2014).

2.5 Summary

The emergence of the DIC shows that the field of application for design practices and the design professional is growing. Whereas until recently design was seen as a tool for translating technology-driven innovations into aesthetically pleasing products, design has manifested itself as a powerful driver for change in both small and large firms.

Abundant examples of large in-house design teams (Philips, Coca-Cola, IBM) and acquired design firms (Accenture, McKinsey, Deloitte) show that design is increasingly seen by large firms as something that, like multiple scholars argue, creates an added value to the existing value propositions.

In smaller firms such as SMEs, resources are often scarce. As a result, firms are often not capable of employing a complete design department, let alone acquire a design studio. These firms are often willing to investigate the potential that well-developed design capabilities have. The DIC represents a low-threshold opportunity to explore this.

Investing in design capabilities is also attractive in the field of software development. For one, software development experiments with new methods of product development (such as scrum, agile, and design sprints), more than traditional industries. Next to that, software development strongly relies on an iterative approach to product development that values experimentation. This approach is similar to the design thinking approach to product development.

These factors combined make that a DIC can be extremely valuable to a software SME in exploring the potential of improved design capabilities for their competitive position.

3. Introducing CM

This chapter introduces CM, the company that is the subject of this research. It first introduces the company's history and core values. After which CM's vision on the future and ideas about product development are described. The chapter concludes by a description of the company's role in the market.

3.1 History

CM was founded in 1999, when two friends saw an opportunity to support the hospitality- and entertainment industry in their marketing efforts by sending text messages to inform regular visitors about special events or promotions.

The company quickly expanded into other industries where it provided SMS-based services. For example, to schools which started to use text messages to inform students of changes in their timetables.

Text messages have remained at the heart of the company's value proposition, but the applications for them have expanded. Examples include 'SMS parties', which allowed visitors to have their text messages displayed publicly during events, and SMS-voting, which allowed people to cast their vote in TV competitions through a text message.

The company's success in SMS-based value propositions led to the development of other products that allowed the CM's customers to manage payments, calls, and identity protection for mobile users.

The success led to the company's international expansion. CM has opened offices in Belgium, France, Germany, the United Kingdom, South Africa, China, and Japan.

Over the course of the 18 years since the company was founded, CM won numerous awards. Including awards for being the fastest-growing tech company in the Netherlands and being the country's best place to work.

3.2 Core values

The findings of an organization-wide exercise to define CM's brand identity in 2016, were formulated in a brand compass, which intends to provide a direction for CM. Three core values make up the backbone of this compass.

Reliable

CM presents itself as a bridge between its customers and their customers, by providing businesses with a platform that can handle all types of interactions, whether this is a text message or a secure payment.

It is crucial CM provides a sense of safety and security to their clients. This is done through an operation with a near-100% uptime, which is monitored and supported 24 hours per day, all year round.

The dedication to reliability has led to the company receiving four ISO certificates. This also allows the company to compete in government tenders.

Enabling

CM sees its enabling role in the facilitation of communications, interactions, and transactions between the CM's customers and their customers, as the core of its operation. In doing so, the company enables its clients to enhance their relationship with their respective customers.

Furthermore, the company has created a platform to bring innovative people together called MoCo. This platform does so through blogs, YouTube videos and physical meet-ups all around the world.

Connecting

This value describes the role the company sees for itself: Providing a set of technical tools and connecting different means of technology to create an ecosystem of means that allows CM's customers to connect with their respective customers or community.

3.3 Vision, ambition and mission

The core values discussed in the previous section were discussed more in depth in CM's strategic plan and brand compass. CM sees a hyperconnected world where communications are much easier. This goes for communications between people (person-to-person), between machines (machine-to-machine), and between people and machines (person-to-machine and machine-to-person).

To CM, technology is in service of enabling a higher quality of life. From CM's perspective, technological systems must become more human to enable relevant human interaction.

CM's mission is to play a role in this by making these interactions between humans and their technologies possible through smart solutions that enable people to communicate, interact and make payments all across the world.

To achieve this, the company develops and exploits a mobile platform through which CM's customers can make extensive use of all CM products, and through which third parties can offer their own products. This platform will be further highlighted in the next section.

In the coming years, the company wants to build a reputation as being the world's most human high-tech company. In its strategic plan and brand compass, CM writes it intends to achieve this goal by becoming a "benchmark, trend-setting and absolutely reliable enterprise" that finds "innovative applications within existing ecosystems" to "make people's lives more enjoyable, easier, or safer".

3.4 Products

The company's products are available through an Application Programming Interface (API) or through the company's online platform. The API is an attractive solution to many of the company's bigger customers, as it allows CM's products to be integrated into their own systems.

A third way in which CM's products are made available is through resellers. This means that CM's tools are incorporated in software sold by third parties. An example could be a registration system that automatically sends a text message when a product has been delivered.

The online platform provides nearly all products through a web-based interface. This is especially useful to less technically skilled companies or those that lack the resources to build their own software tools. Examples of these types of clients include dental clinics or small retailers. The products are categorized into one of four categories; text, talk, pay, and access, further discussed below.

Text

These products form CM's original business and revolve around sending text-based messages between applications and people (A2P messaging). Examples of these include SMS messages, and push-notifications.

Talk

This segment are the company's voice products. A voice product or service allows the customer to reach his customers by phone.

Pay

Payments are the transaction or exchange of value or wealth between two parties. Generally, one side of the transaction is monetary. CM provides the opportunity for mobile payments in this sector. One example would be to donate to charity through a text message, where one would send a specified text to a specified phone number and the person is billed accordingly. Another example would be through supporting innovative online payment methods such as the ability to make iDeal payments using a QR-code.

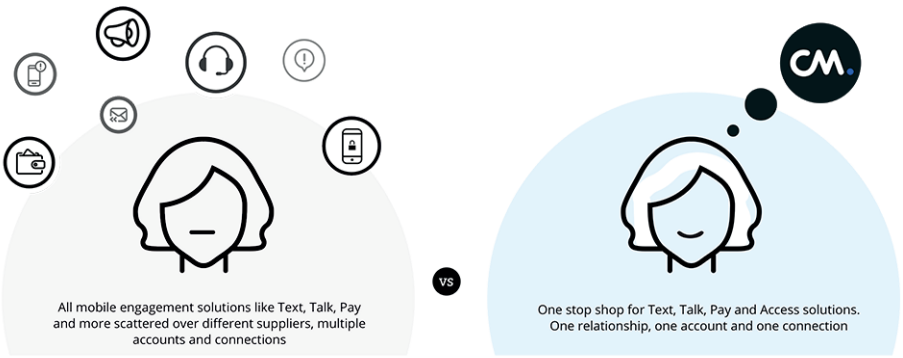


Figure 2: CM's vision of the platform's service

Access

The final category of products CM offers is access products. As single-layer security checks (a username and password) are often no longer seen as enough protection, CM offers products that help provide a second layer of protection for companiess, also known as two-factor authentication (2FA). A well-known example of 2FA are one-time passwords, that are sent to people trying to log on to the online environments of banks and governments.

When looking at CM's product portfolio, one can see that the company's product development is strongly solution centred (Nusem et al., 2017) (Figure 3).

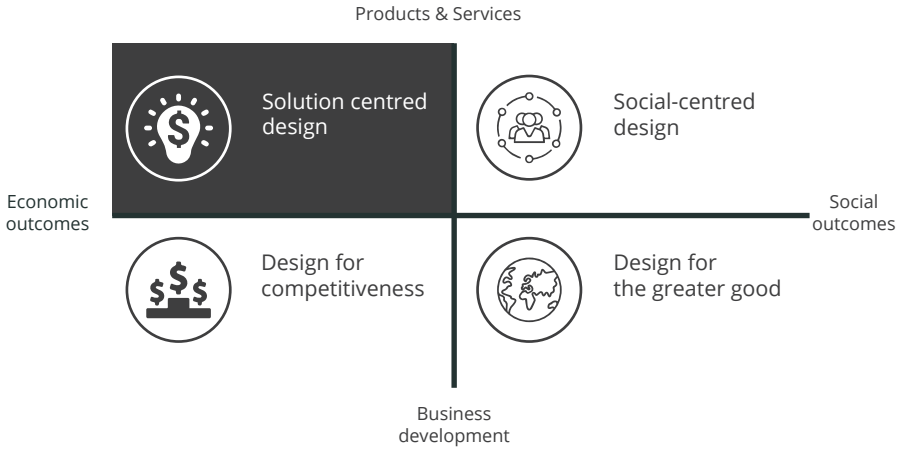


Figure 3: CM's position in the four purposes of design matrix

3.5 Vision on product development

CM has a strong vision on how it sees (new) product development (NPD). CM argues customer demand is most important to determine the requirements for products. This allows the company to develop products that have a very good fit with the market. Most of these products must be made available on the aforementioned platform. This creates high accessibility and allows customers to easily expand on the way they reach their customers by acquiring a set of various products.

Next to a strong market fit, the company wants all products, including the platform itself, to have an unmatched ease of use, which creates a positive user experience. Another way the company intends to provide a positive user experience is by providing an experience of continuous improvements.

At the core of the product development strategy lie three values; in-house development, fail-fast development, and the ESSA method.

In-house development

The company argues that knowledge of products and technology is often too valuable and should therefore be kept in-house. Furthermore, CM sees that having people employed by the organization are more involved and contribute to the company's growth.

Fail-fast development

For CM this means that operations are stopped when unexpected errors occur and are able to quickly improve when things do not work. The company works through the notion that a release should be the smallest possible feature, allowing for short development, learning, and improvement cycles.

ESSA method

Introduced by former Shell CEO Jeroen van der Veer, ESSA is an acronym for Eliminate, Simplify, Standardize, and Automate. The company believes this creates more efficient operation of the business and allows people to spend more time in a productive manner. For the company, this means looking to standardize as much as possible, and make scaling as much technology-driven as possible. The company's hiring policy to hire people that diversify the company's capabilities, creating a culture of experts.

3.6 Market position

This section describes CM's market position in two ways. First, it describes CM's role in the value chain. Afterwards it describes the company's market position through the 5-forces model described by Porter (2008).

3.6.1 Market role

CM describes its market role as an aggregator. Facilitating the bridge between the company and their target group. In text messages, this means a large customer provides the company with phone numbers of those it wants to reach, along with the message it wants to send, the company will then send the message to everyone in the list of phone numbers. The company also plays this role in the other product-markets in which it is active. Figure 4 shows this value chain. The company plays the same role in the market for their voice products.
In the payments and access market, CM plays a slightly different role. In the payments market, CM serves as a payment service provider (PSP). A PSP facilitates its clients to receive payments from their customers. CM's products in this market focus on mobile payments (for example, by allowing customers to pay by scanning a QR code).

In the access market, CM plays a role similar to the one it plays in the payments market. In this market, CM offers their customers tools to enable safe and secure access to their on- and offline environments. Examples of access products for online environments include the one-time-passwords to login for government or banking services. For offline environments CM offers tools to distribute and scan access tickets.

In all of these markets, CM plays a facilitating role. As a result, CM can be described as a silent force working in the background. CM's Chief Technology Officer describes that he sometimes encounters people that have difficulty seeing CM's impact. In response, he asks them to imagine what would happen if the customer service for a large Dutch meal-delivery service is unavailable for a few hours on a Saturday evening.

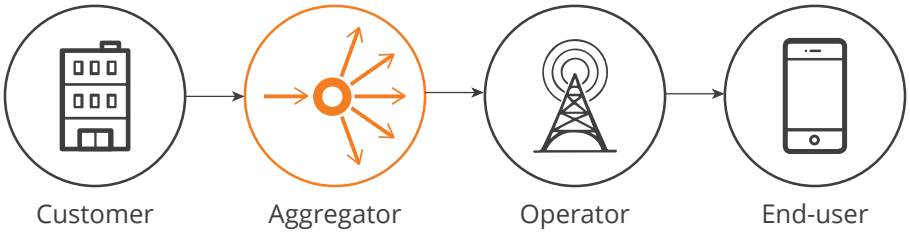


Figure 4: CMs position in the value chain of the text and voice markets

3.6.2 Market forces

This section describes the company's market dynamics through the five forces model (Porter, 2008). The market forces are based on the way they are described in CM's brand compass and business plan. The model filled out for CM's market is shown in figure 5 (page 34).

Bargaining power of suppliers

As figure 4 shows, operators are the gatekeepers between CM and the end-user. These operators were not dependant on CM for their activities. All users of mobile connectivity are a customer to these operators. Therefore, operators have a relatively high bargaining power.

However, a number of substitute operators were available. This mitigates supplier power to bargain. Together, the bargaining power of suppliers is medium.

Bargaining power of buyers

CM had many customers, of which none had a share that exceeded a few percent of the total revenue. This made that CM was not dependent on any one of her largest customers. Next to that, the wide array of markets in which CM operates made it relatively insensitive to fluctuations or disruptions in these markets.

Furthermore, CM possessed a set of capabilities that enabled CM to meet specific customer requirements. This gave CM a strong position towards its customers in describing costs and terms of use. This makes the buyer's bargaining power low.

Threat of new entrants

To effectively enter CM's market, entrants faced a number of specific hurdles. The first of these hurdles was the technical complexity to build a communications platform that was modular, enabled expansion and able to process large volumes of data per second.

The second major hurdle was a regulatory one. Having to comply with data and privacy regulations, payment licenses, and protection against cybercrime was time consuming and costly.

This made the threat of new entrants relatively low, on the basis that developing the capabilities similar to CM's is difficult.

Threat of substitute products or services

Since its start in 1999 CM has built a portfolio of products that are largely adjacent to each other. For example, next to SMS messages, CM's platform is also able to send push notifications. This made that CM was not dependant on one specific technique and themselves able to service their customers through various tools.

Because CM's platform was highly modular, new technologies could easily be implemented in CM's portfolio. Together, this made the threat of substitutes relatively low.

Rivalry among existing competitors

CM had different competitors in each of its 4 product categories. The messaging market operated on a global scale where many competitors possessed market shares that were substantially bigger than CM's. The voice and payments markets were much more fragmented with many smaller players focusing on specific regions. There were only a few players on the global market, but each of them possessed a share far larger than CM's.

In all markets CM faced strong competition. In local markets this was because the market was very fragmented, which made it difficult to build a large market share. In global markets this was because the market had consolidated and was dominated by a small number of large firms.

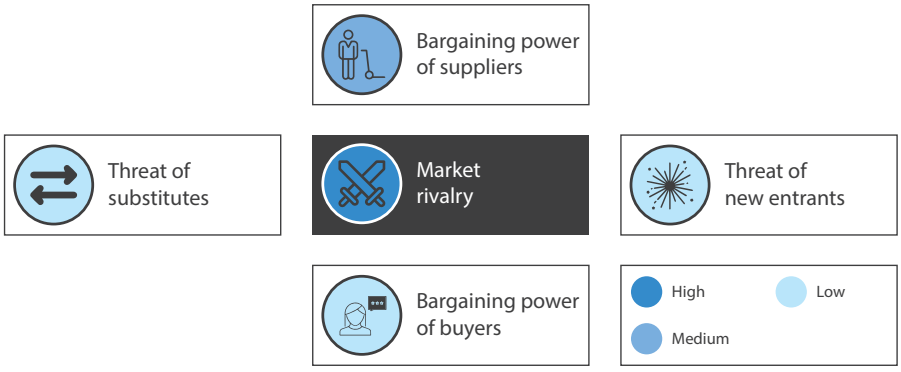


Figure 5: Porter's 5-forces model for CM's operation

4. Understanding the initial state of design capabilities in CM

This chapter describes the catalyst's exploration of the company to understand the initial state of design capabilities. It first describes the method the catalyst applied to make this assessment, after which it describes the research that was used to make this assessment and its findings. Based on these findings, the report describes the suggestions the DIC made to CM to take first steps in developing design capabilities.

4.1 Method applied to investigate CM's initial design capabilities

This section briefly describes three methods to assess design capabilities, after which it explains what method was used in this research.

Evaluating design maturity in organizations is relatively unexplored in academia. Most frameworks to make an assessment of organizations originate from the Danish Design Ladder (Kretzschmar, 2003). Kretzschmar proposes an easy-to-understand framework that distinguishes four levels of design maturity, shown in figure 6. These four levels are explained more in depth in table 2.

The Danish Design Ladder was elaborated to allow for an assessment on 5 specific aspects of design maturity in an organization. This resulted in the Design Management Staircase (figure 7; Design Management Europe, 2009).

The Design Management Staircase was expanded into the Design Capacity Model (Storvang, Jensen, and Christensen, 2014). The Design Capacity Model (DCM) qualitatively assesses the maturity of design capabilities in a company. This was done by defining ordinal definitions of different levels of maturity for each of the

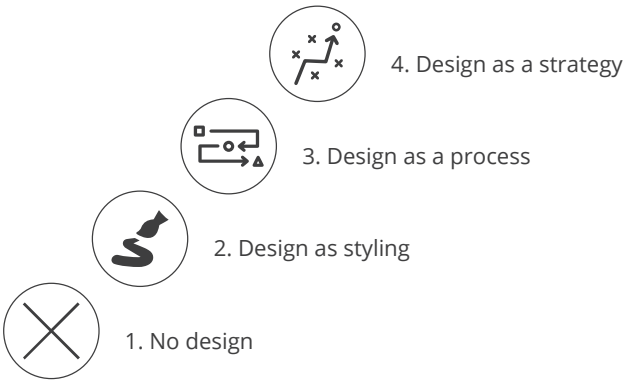


Figure 6: Danish Design Ladder, adapted from Kretzschmar (2003)

Level	*Name*	*Definition*
1	No design	Design solutions are based on the judgment of aesthetics and functionality of those involved. The user does not play a significant role (Kretzschmar, 2003)
2	Design as styling	Design is a viewed as an aesthetic finish to the product
3	Design as process	Design is a method used throughout product development projects. It is also used for discovery of opportunities
4	Design as strategy	Design is used as an approach to business strategy to understand and address the challenges a company may face

Table 2: Definitions of levels in the Danish Design Ladder

five scales defined. Figure 8 (page 40) displays this model and table 3 lists the five scales defined in the model. Appendix A provides all levels used by the scale. For legibility reasons, the model is displayed without scale definitions the report. Instead, it lists the scale titles described in table 3.

Because the catalyst sought to build an as-accurate-as-possible understanding of the company's strengths and weaknesses with regard to design capabilities, the Design Capacity Model was used to assess the company's design capabilities. This detailed information allowed the catalyst to define propositions about first steps for the CM to take in building design capabilities.

As CM's management team did not have a background in design research, they were not expected to understand the details of the Design Capacity Model. Therefore, the assessment made through the Design Capacity Model was translated to an assessment based on Kretzschmar's Danish Design Ladder. The DIC provided more details on the assessment in a physical meeting, because specific details were likely understood better when communicated in person.

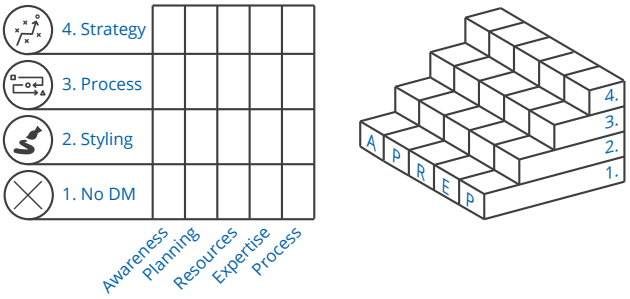


Figure 7: Design Management Staircase, adapted from Design Management Europe

Scale	*Measure*	*Definition*	*Levels*	*Lowest level*	*Highest level*
1	Design awareness	Those in the company that are aware of the value ¬of design-led innovation practices for a company's competitiveness.	5	No one	All employees see design as an important factor.
2	Importance	For what jobs within CM is design used.	6	Not important	Strategy and management
3	User's involvement	The extent to which the company engages with users.	5	No engagement	User communities and lead users
4	Innovation drivers	The reasons for the company to innovate	4	Technology driven innovation	Design driven innovation
5	Design capabilities	Employment status of designers in the company	4	No designers employed	Both internal and external designers

Table 3: Definitions of levels in the Danish Design Ladder

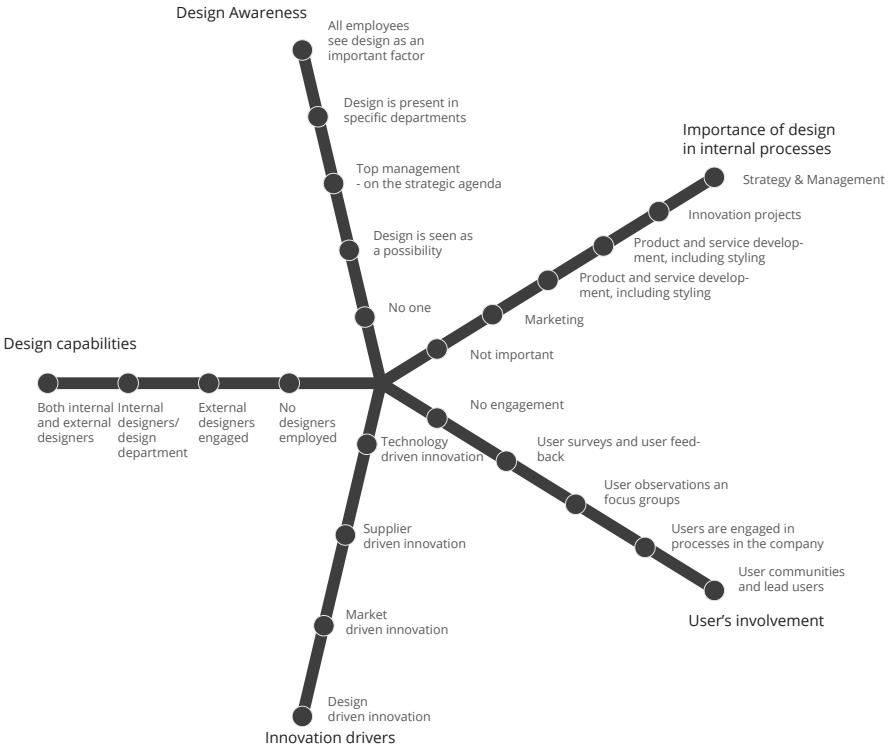


Figure 8: Design Capacity Model, adapted from Storvang et al. (2014)

4.2 Quantitative investigation of CM's initial design capacity

In order to make the assessment described in the previous section, both a quantitative and a qualitative investigation were conducted. This section describes the quantitative investigation of CM's design capacity at the start of the catalyst's tenure at the company. It does so by first describing the method used for this, after which it describes the results gathered. The results are discussed together with the results of the qualitative investigation in section 4.4.

4.2.1 Method

Participants

In total 77 people in CM's main office in Breda were approached personally by the catalyst to fill in the survey. All of them filled out the survey. This number was determined to be sufficiently robust based on the method provided by Barlett, Kotrlik, & Higgins (2001). The participants all held positions in different departments in the company. The participants were approached randomly out of a total of 177 employees the company employs in the Netherlands. The research defined 4 major departments in the company; development, marketing, sales, and support. As

not all employees in the company were employed in one of these, a fifth category, other, was defined. The distribution of participants over these categories, as well as the distribution of all employees for these categories is shown in table 4 and figure 9.

Department	*Respondents*	*Total no. of employees*
Development	28	44
Marketing	11	18
Sales	10	14
Support	8	16
Other	20	85

Table 4: Distribution of participants and employees

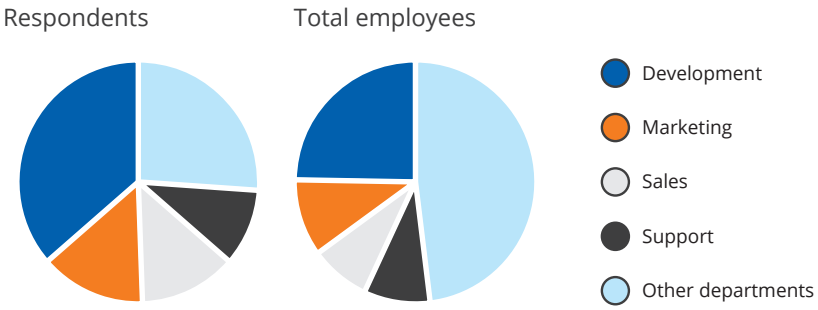


Figure 9: Distribution of participants and employees

Questionnaire

The questionnaire used was based on the Design Capacity Model (Storvang et al., 2014), presented in figure 8 (page 41). To the five-scale model proposed by Storvang et al., a sixth question was added, asking the respondent to list the department in which he or she was active. 3 (page 39) describes each of the measures.

The question asking the respondent to list the department in which he or she held a position was asked through a multiple-choice option. This allowed the participant to choose only one of the predefined categories. This was done to prevent a large array of responses being given, which would make it difficult to discover differences between groups.

Procedure

The questionnaire was printed on an A4 sheet and distributed by the catalyst over the course of two afternoons. The paper-and-pencil distribution of the questionnaire intended to improve the response rate and allowed the catalyst to directly answer any questions the respondents might have, or clarify ambiguous wording used in the questionnaire.

The results were entered into an excel sheet by the catalyst and transferred to SPSS version 22. The total means were calculated and compared for each individual measure, both for the entire sample and for the departments individually.

4.2.2 Results

The mean answers given by the employees in different departments are displayed in table 5. Figure 10 projects the total means on the Design Capacity Model.

A one-way ANOVA was used to understand the effect of the variable of department on each individual measure. A significant effect for the department variable was found for three of the five measures. The three significant effects found were further investigated through a post-hoc comparison using Hochberg's GT2 criterium (Field, 2009).

First, the significant effect for the department variable on awareness at the $p \leq 0.05$ level for the five departments [$F(4,72)=2.94$, $p \leq 0.05$] was investigated. A post-hoc comparison indicated that the mean scoring by the development department ($M=4.04$, $SD=0.838$) was significantly higher than the scoring provided by those in the other departments ($M=3.03$, $SD=0.923$), $p \leq 0.05$.

The second significant effect was found for the department variable on innovation drivers at the $p \leq 0.05$ level [$F(4,70)=3.03$, $p \leq 0.05$]. The post-hoc comparison found the scoring by marketing ($M=1.55$, $SD=0.934$) was significantly lower than the scoring by the development department ($M=2.77$, $SD=1.070$), $p \leq 0.05$.

The scoring provided by the marketing department ($M=1.55$, $SD=0.934$) also proved to be significantly lower than the scoring provided by the respondents in the other departments ($M=2.75$, $SD=0.967$), $p \leq 0.05$.

The one-way ANOVA also found a significant effect for the department variable on the importance variable at the $p \leq 0.05$ level for the five departments [$F(4,72)=3.23$, $p \leq 0.05$]. The post-hoc comparison using Hochberg's GT2 criterium did not return any significant effects between departments at the $p \leq 0.05$ level.

Taken together, these results indicated that there were differences in the evaluation of CM's design capacities between the different departments. Especially the development and support departments evaluated the different measures higher than the total sample mean, whereas the marketing department generally evaluated measures to be below the total sample mean.

Measure	*Total*	*Marketing*	*Sales*	*Support*	*Development*	*Other*
Awareness	3.79	3.82	3.80	4.13	4.04[a]	3.30[a]
Importance	3.58	2.64	4.10	4.13	3.82	3.30
User's involvement	2.30	2.00	2.00	2.75	2.36	2.35
Innovation drivers	2.53	1.55[b,c]	2.40	2.75	2.77[b]	2.75[c]
Design capabilities	3.12	3.36	3.00	3.25	3.14	2.95

a,b,c: the mean difference is significant at the p≤0.05 level.

Table 5: Survey means

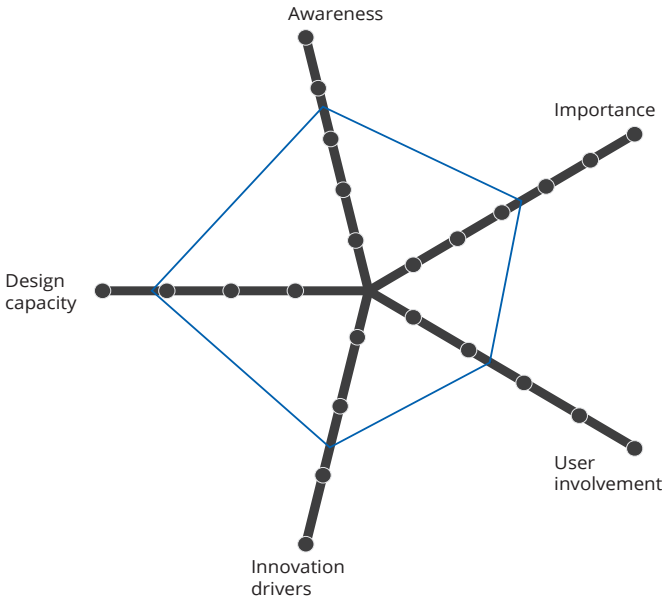


Figure 10: Mean scorings displayed on the Design Capacity Model

4.3 Initial qualitative exploration of CM's culture and perceptions of design

Whereas the previous section describes the quantitative exploration of CM's design capabilities, this section describes the catalyst's exploration of CM's culture and perceptions of design. As in section 4.2, it first describes the method used after which it presents the results. These results are discussed in 4.4, together with the results of the quantitative investigation.

4.3.1 Method

Participants

Interviews were conducted with 17 employees in the company. The interviewees held positions in different levels of seniority in various departments in the company. Appendix D lists all positions held by the participants. The most senior interviewee was CM's Chief Technology Officer, the most junior interviewee was a product marketer that had been with CM for only a few months.

Topics

The interviews were intended to explore the company. They took place during the first weeks of the catalyst's presence at CM. The interviews followed a conversational approach. To prevent the conversations from not yielding any results valuable to the research, the catalyst defined four conversation topics. These four topics are briefly introduced below.

Topic 1: The employee's attitude towards design

This encompassed the way the interviewee saw design. It included a discussion about what the interviewee saw as the function of design in the organization; who he or she saw as responsible for design in the organization; and their thoughts on the state of design in the organization.

Topic 2: The gathering and processing of user insights

A big topic in the interviews was the company's way of gathering and processing user insights and feedback. The conversation touched not only on the current state, asking how, when, and why feedback was collected and by whom, it also touched on the question of what would be an ideal method to do this in the interviewee's eyes.

Topic 3: Product development methods applied by the company

This interview topic was mainly discussed with the employees in the development department as they are most involved in the development process. The aim of this topic was to understand the way the development process works. This understanding helped to align the catalyst's actions with existing practices to increase the chances of adoption into daily routines.

Topic 4: The interviewee's attitude to user engagement in the NPD process

Being able to understand barriers to the adoption of user-centred design practices in the organization required an understanding of the organization's attitude to the involvement of users in the product-development process. The interviews touched on the existing practices, asking questions about the interviewee's opinion on the current ways in which the user is involved and asking what they would improve.

Procedure

The conversations took place in the first weeks of the catalyst's presence in the company. Table 6 lists the number of conversations per week. All conversations were conducted at the company's main office in Breda.

The interviews were not recorded. This helped to maintain an informal setting that benefitted the catalyst's introduction in the company. Instead, data gathering was done through interview notes.

Week	*Conversations*
1	5
2	5
3	2
4	0
5	5

Table 6: Conversations per week

The notes were processed using thematic analysis (Braun & Clarke, 2006). This process involved data familiarization, initial coding, searching for themes, reviewing themes, defining themes, and producing the report. The first five of these describe essential actions in thematic data analysis.

Below, the catalyst's approach to each of these is outlined. The thematic analysis uses three different-yet-adjacent terms throughout the process. Table 7 briefly defines these.

Term	Definition
Note	An individual quote gathered in an interview. E.g. "If you have a good idea, you are given the room to develop this further".
Code	A grouping of notes based on the topic the group discussed. E.g. interviewees discuss contact with customers.
Theme	A topic that recurs in different codes. E.g. attitudes to user involvement in the NPD process.

Table 7: Definitions used in thematic analysis

Data familiarization: The catalyst familiarized himself with the data through reading through the interview notes and entering these into a computer.

Initial coding: Initial coding was done by printing all individual notes and arranging them according to any overarching topic discussed. The catalyst used this process to define three levels in the codes. The findings of these are discussed in the results section. A list of the three-level distinction is presented in Appendix E.

Searching for themes: The findings from the qualitative exploration were then enriched with data gathered in the quantitative exploration. This allowed the evaluation of individual notes in the perspective of these results. Together these produced a set of initial themes, that all address the first research question in one way or another.

Reviewing themes: Themes were then reviewed by the catalyst and a small team of people in the company, including CM's design team.

Defining themes: Given the revisions themes were made definitive. These defined themes are discussed in the discussion section.

4.3.2 Results

Throughout the interviews, 334 notes were created. These were subjected to an initial coding; creating a set of 9 themes. 8 of the themes related to one of the four interview topics; the ninth theme contained 4 notes discussing miscellaneous topics that could not be assigned to any of the 8 larger themes. Table 8 provides an overview of the topics discussed in the individual themes.

Topic	*Themes included*	*Theme description*	*Notes assigned*
Topic 1: Employee attitudes to design	Attitudes to design	The different views employees express about design and the role of design professionals in the organization.	42
Topic 2: Gathering and processing user insights	Customers	The way CM engages with their customers.	43
	Attitudes to quantitative data	The extent to which CM prefers quantitative data over qualitative data.	19
	Internal means of sharing information	The means the company has deployed to improve internal communications and knowledge sharing.	13
	Role of support in the organization	The role the support department plays in the organization in the product development process.	11
Topic 3: Product development methods applied by the company	Self-referentiality	The extent to which CM relies on its own ability to come up with novel solutions or product improvements.	69
	Company culture and processes	The values that underpin the company and the way the company translates this to everyday business.	41
Topic 4: Interviewee's attitude to user engagement in the NPD process	Attitudes to user testing	The views employees have towards the involvement of users to test and evaluate new products.	92

Table 8: Note distribution over the four inverview topics.

Topic 1: Employee's attitude to design

The interviews explored the attitudes toward design amongst different employees. Many interviewees perceived design as a tool for styling rather than a process that can help discover opportunities.

The interviewees concentrated the designers' responsibilities around making ideas aesthetically pleasing, because much of the initial idea development was done by product managers or developers within CM.

> *"We make a sketch for a new feature, one of the designers will then translate that to a mock-up version"*
>
> *Junior product marketer*

Some, especially the younger developers, described a potential benefit for design in their work. They argued that if a design was made well, it would save them time. It would save time because they wouldn't have to re-work something when they discovered it did not work very well during a demonstration. Naturally, the time a designer would spend should not exceed the development effort.

> *"It would help if a designer would be involved at the beginning of the development cycle to think about the way it should look"*
>
> *Junior developer*

> *"We do have to be sure that the time designers need to make a solution is less than the time developers need to fix the issue"*
>
> *Junior developer*

Front-end developers also discussed they liked working from a described design. They argued it spared them the difficulty of thinking about the appearance, having more time available to make the idea work.

They also noted that the small number of design professionals in the organization forced them to do some of the designing themselves. During the interviews, the company employed one full-time designer and two part-time designers, and the full-time designer had already announced his resignation.

As a result, designers were forced to choose between covering a few products in depth and thereby neglecting other products, or covering all products but leaving the details to individual developers.

> *"We get the room to think of solutions ourselves, but I think [UX Designer] and [UX Designer] are better at that"*
>
> *Junior developer*

> *"We now have people for usability; [UX Designer] and [UX Designer], but you see that they are being overloaded with tasks as well"*
>
> *Senior digital marketer*

Some interviewees argued that this is problematic to the company, as they explain that they think that customers leave because the shallow product design had a negative impact on the customer experience. Others argued that the styling of products is only a minor detail that is compensated by the product's technical performance.

> *"There are many things that don't fit with our company; that really is a missed opportunity"*
>
> *Senior front-end developer*

The interviews showed that employees started to acknowledge the organization's design capacity was insufficient to support a uniform appearance of the company's product portfolio. Other attitudes showed the interviewees looked at the design professional's role as being responsible for improving the aesthetic qualities of CM's products.

Topic 2: Gathering and processing of user insights

The second topic encompassed the way CM gathered insights from users and customers and the way these found their way into product development processes.

Four initial themes were connected to this topic;
- CM's engagement with their customers;
- The company's preference for quantitative measures;
- The methods used by CM to internally share insights or ideas
- The role the support department plays in this process.

CM's engagement with customers

Employees noted that because CM operated in a business-to-business market, it had intensive contact with its main customers. This contact occurred through one-on-one engagements by a sales representative. Each of the 14 sales representatives employed by the company during the research was specialized in a specific market.

CM also engaged with their customers through events it organized around matches of the local football team, of which the company was the main sponsor. During these events, the company invited their main partners for an informal event where the company presented their work and gathered feedback from customers.

> *"Visiting customers is something that should be done by account- and product managers"*
>
> *Head of software development*

> *"Clients can be invited, so you can show them what it is that you're working on"*
>
> *Senior front-end developer*

Although many interviewees saw contact with clients as a valuable addition, some were sceptical about the practice because they feared it would be at the expense of people's day-to-day activities. One front-end developer noted that although he wanted to learn from customers, he thought it was a good practice for any questions to be were directed at the product manager.

> *"If people would start sending me e-mails directly, I would not be able to do my work anymore"*
>
> *Senior front-end developer*

One could thus argue the company engaged with customers, but not necessarily with the users of the products.

CM's preference for quantitative measurements

CM preferred to gather information through quantitative measurements. In an introductory conversation with the catalyst, the managing director noted that he saw potential for the company to start learning from the data gathered by their tracking tools.

Other interviewees also mentioned they saw quantitative data as the basis for the company. They argued it provided trustworthy information and allowed to make well-founded decisions.

> *"We could make customer profiles based on the data that we gather"*
>
> *Head of software development*

> *"Data should be quantitative, reliable, and actionable, because only then I can make decisions based on it"*
>
> *Marketing coordinator*

The value attached to quantitative data indicated the company was trying to build an understanding of the customers to be able to improve products for them. However, they did feel qualitative data was too ambiguous to act upon.

Methods used by CM to internally share insights and ideas

Although CM strongly preferred quantitative data because it viewed this data as being more actionable, a number of interviewees noted it is not used very much by the company. An important reason for this were the difficulties in interpreting the data because discrepancies existed between data gathered through external tools and internal tools.

Instead, much of the knowledge shared in the company had a qualitative base, shared through social intranet tools. These social intranet tools were the main places where employees shared their ideas for product development. Although many interviewees argued this method worked quite well, others noted that the effectiveness would benefit from more intensive moderation.

"I once made a proposal on the internal forum, but to be honest, I have no idea what has been done with it"

Sales manager

The attitudes to quantitative measures showed the CM was aware of the value of external sources of information. However, a standardized means of sharing and acting upon them was not embedded in the organization.

The support department's role

The support department played an important role in the development of new products and the improvement of existing products, as they were in contact with customers who experienced problems and therefore receive much feedback about products. Interviewees argued the support department often found itself helping customers find things rather than fixing real (technical) problems. Improving the usability of the company's website and products would therefore benefit the support department as well.

To conclude on this topic, it can be noted the company engaged mostly with their biggest customers. This data is mainly qualitative data. The information gathered was partially lost between e-mail boxes or CM's intranet tools. Although this data was often qualitative, the company preferred to use quantitative data, because it was perceived as more reliable.

Although both qualitative and quantitative data were not always acted upon for a variety of reasons, interviewee comments showed the company's awareness of the value of knowledge on use and usability.

Topic 3: Product development methods applied by the company

The base of CM's processes in product development were formed by CM's culture. Another very important aspect of CM's approach to product development is the value it attaches to self-developed ideas about product improvements.

Company culture and processes

Interviewees all valued the freedom CM to provided individuals to pursue their own interests. Also in its branding exercise, CM showed it valued employee's individual ideas highly, as it invited all employees to join workshops and share their ideas.

The company also displayed the value it attached to employee's knowledge and expertise by having a preference for specialist employees rather than generalists. CM's managing director provided a detailed explanation of this policy, noting the company relied on specific knowledge to help CM diversify and grow. Furthermore, the managing director emphasized that this strategy also meant that CM aimed to standardize and automate repeatable processes and use human resources for high value work. Others underline this statement.

"When we hire people, it's intended to diversify our company's competences"
Head of software development

In the product development, appreciation of individual's skills and expertise is shown through the freedom to pursue personal interests and develop products and features according to their own insights. Employees noted the following on this topic;

"If your idea doesn't work, we can always decide to discontinue it"
Event coordinator

"If you have ideas yourself, you can always go to [Head of software development] and if he thinks it is an interesting opportunity, you're free to pursue it"
Junior development

The product development process followed a scrum-like method of one-week development cycles. At the start of the week, development teams meet to plan their work. During these meetings, developers could choose their preferred tasks to work on. Individual developers are also trusted in the quality of their work; they could implement any changes directly into the 'live' products.

In short, the company valued individual contributions highly in the company's day-to-day operations. It reflected this stance in the hiring policy and in the freedom provided to individuals to pursue personal interests.

Self-referential approach to product development

The substantial trust CM placed in individual employees was also reflected in CM's trusting its own ability to discover novel solutions or product improvements.

Interviewees from all departments mentioned this was the general approach to product development in the company. An often-heard argument for this is that enough ideas for novel solutions that required development effort are known within the organization. Therefore, efforts intended to engage the user for inspiration were therefore not regarded to be a priority, given CM's positive growth and the aforementioned abundance of ideas internally.

"There is more than enough to improve based on our own common sense"
Marketing coordinator

"[product] works very intuitive, because we have a lot of shortcuts pre-programmed"
Sales manager

One software developer noted his awareness of the detrimental effect of a bad usability of an application on the customer satisfaction. To address this, the developer noted he and his team developed use flows they argued to be logical.

"too many options for customers creates problems in their usage, so we shouldn't make app usage too difficult"

Developer

"We just develop a flow and take that to customers, where we tell them that we have found a solution to their problem"

Developer

Furthermore, more senior employees noted their hesitation to involve customers or users because they felt that contact with customers would inevitably lead to tailor-making of products for that specific customer. This would be in contrast with CM's strategy; preferring to build standardized products for a wide range of clients.

To summarize, the company's product development process relied largely on the ideas and expertise available within the company. In one part because the company attached much value to individual expertise. The other part is rooted in CM's belief that as long as novel ideas for improvements were identified by internal sources, there was no direct need to look towards external sources, like users, for ideas.

Topic 4: The interviewee's attitude to user engagement in the NPD process

The interviews also discussed the interviewee's attitude towards engaging users to evaluate CM's (new) products. Different aspects of this were discussed with interviewees. This included; the type of people to be approached for testing; the existing practices for user engagement; the potential difficulties user testing would create; and the means to use for collecting feedback from users.

Interviewees expressed different views on the participants in usability evaluations. One developer argued students would be a suitable group to involve, whereas another preferred to involve real customers.

The diversity in opinions on user engagement was also reflected in other aspects of user engagement, including the means used to collect feedback. One developer noted he liked receiving feedback, whilst another saw it as too time consuming.

"I really like to receive feedback, I'm curious to know what people think of my work"

Senior developer

"Contact with customers is a very time-consuming process"

Senior developer

New products were tested from a very technical point of view and generally only by other software developers, looking to understand how an application reacted under unique cases of non-standard user behaviour. Usability evaluation of products often meant a team of developers clicking through an application.

"We usually test applications by just clicking through them"
Senior front-end developer

"Users test pre-defined cases, we always test the 'extreme' events"
Developer

To collect feedback from outside the company, more technically oriented employees expressed a preference for a forum-style tool on the company's website or platform for people to leave their comments, whereas marketers also expressed an interest in personal contact.

"Ideally I would just want to call people and ask them 'how did you find us and did you find what you were looking for?'"
Marketing coordinator

"You need to have something like a tooltip that people can use to make suggestions"
Senior developer

Overall, opinions on user engagement in the NPD process varied substantially. While some were positive about the involvement of users in the process, others saw it as a distraction from their day-to-day activities.

Most interviewees agreed that user involvement was not necessary to discover new product opportunities. They posed that any involvement should focus on improving existing products.

4.4 Combined findings from the qualitative and quantitative exploration

This section aims to discuss the combined results from the qualitative and quantitative exploration. It first discusses different attitudes to design that existed in CM. After that, the barriers in the organization to the implementation of user-centred design are discussed. The section concludes by discussing CM's design capabilities in relation to the Danish Design Ladder.

4.4.1 Variations in attitudes to design

Observations indicated that there are differences in the perception of design in the organization. Two factors lie at the basis of these differences.

First, as a wide array of definitions of design exist (Braga, 2016), an important factor that formed different perceptions was individuals using a different definition of design. This section further elaborates on this.

Second, as the results from the survey showed, individuals in the same department provided relatively similar responses. This allowed the suggestion that individuals in the same department shared the perspective of CM's design practice. Therefore, it can be suggested that departmental perspectives existed.

The marketing department rated CM's performance the lowest on nearly all of the scales of the Design Capacity Model. An explanation for this is that the disciplines of marketing and design are closely related, as both disciplines are often considered to be tools that help to sell innovations. Arguably, a result of this proximity is that the marketing department approached design through the more holistic lens described by Brown & Martin (2015), and thus judged CM's design capabilities more critically than other departments did.

Another explanation may be that in the company, the designers were a part of the marketing department and may be influenced through their close professional relationship to the designers.

The support and development departments provided similar responses to the survey. An explanation for this is that both departments have a technical background, and thus observe the organization from the same perspective. The departments were relatively positive about the role design plays in the organization. These departments experience first-hand how user needs are considered in the product development process, which may have caused the more positive scorings. Furthermore, the support department has a lot contact with customers, and both departments are also involved in product-testing.

The other departments scored the company between the aforementioned groups. These departments are not as much involved in product development and testing as the development and support department, nor do they have a background that is closely related to the design discipline like the marketing department.
It can be argued that they are therefore not inclined to be more positive because of their experiences with product development and testing, nor can it be expected that they are more critical, caused by their backgrounds in disciplines similar to design.

4.4.2 Attitudes to user involvement across departments

During the reviewing process of the interview data, three groups of attitudes towards user engagement that were not confined to specific departments surfaced: The tech-driven innovator, the feedback-driven innovator and the user-driven innovator. These three groups seem to cover the most prevailing attitudes in the company. The groups were formed through thematic analysis, with titles informed by existing literature regarding user-centred design; technology development and new product development.

The first two groups; the tech-driven innovator and the feedback-driven innovator cover the bulk of CM's employees. The largest group is the feedback-driven innovator and accounts for roughly half of the employees. Then, slightly smaller, but still considerable, the tech-driven innovator (about one-third of the employees) and finally a small group of the user-driven innovators. Certainly, there are some attitudes that fall outside these categories, yet together these categories represent the vast majority of the attitudes towards user engagement.
The groups are described in figure 11 (page 57), which provides a short description and discusses the group's goals of user involvement in the NPD process. The following sections introduce these groups more in depth.

Group 1: The tech-driven innovator

The tech-driven innovator prefers what is described by Verganti (2008) as technology-push innovation. This means he prefers very little user involvement in the product development and testing process, but rather prefers to rely on his own vision and technical knowledge. The tech-driven innovator also values standardization over customization in the development process and expresses that high user involvement would lead to the opposite instead.

Like technology-push innovation, design is considered as a tool for product aesthetics. The tech-driven innovator also discusses technological performance of products to be more important than product styling.

The tech-driven innovator argues quantitative measures should be used predominantly as these are free from investigator bias. User research should intent to understand perceived company performance. Methods proposed by the tech-driven innovator are the net-promotor score (NPS), and conversion rates.

Group 2: The feedback-driven innovator

The feedback-driven innovator views the user as a welcome source of information in the product development process. The user can provide this information through feedback about the performance of the product used.

With this attitude, the feedback-driven innovator sits in between the technology-push approach (Verganti, 2008) and the user-centred design approach (Sanders & Stappers, 2008). The attitude is similar to what Desouza et al. (2008) describe as customer-focussed innovation.

In customer-focussed innovation, the user is not involved in the innovation process. Rather, the user is considered source of information. A company can collect information about the user, for example information about satisfaction or usage, and use this to improve the company's offering.

Means to provide this information are ideally tools available online, such as surveys which the user fills out. The feedback-driven innovator views this form of customer engagement as a sufficient feedback loop between customer and business.

Furthermore, the feedback-driven innovator perceives design in a broader perspective than the tech-driven innovator, arguing design should not merely concentrate on the aesthetic qualities of a product, but instead should also concern usability. An example of such a feedback-driven innovator is a developer who discussed that his task wasn't to create products, but also that he had to provide logical (work)flows for users to prevent them from getting confused.

Group 3: The user-driven innovator

This group makes up the smallest collective attitude in the company and consists mostly of people with a more creative role in the organization. Examples are marketers and designers.

The user-driven innovator is similar to what Sanders & Stappers (2008) describe as a user-centred design approach. In this approach the user is the subject of the research. The participant is observed to understand him.

Characterized by his or her positive attitude towards the use of qualitative insights to track performance, the user-driven innovator also expresses the value of design as an upstream- rather than an aesthetic activity. Design is considered to be an activity that opens up new possibilities for the company.

The user-driven innovator, like the other collective attitudes, is somewhat hesitant to involve users in big innovation projects at CM, but this attitude may change when user involvement for smaller projects proves to be a success. Brazier (2004) discusses that a positive experience with design projects will lead to an increased willingness to experiment with design tools.

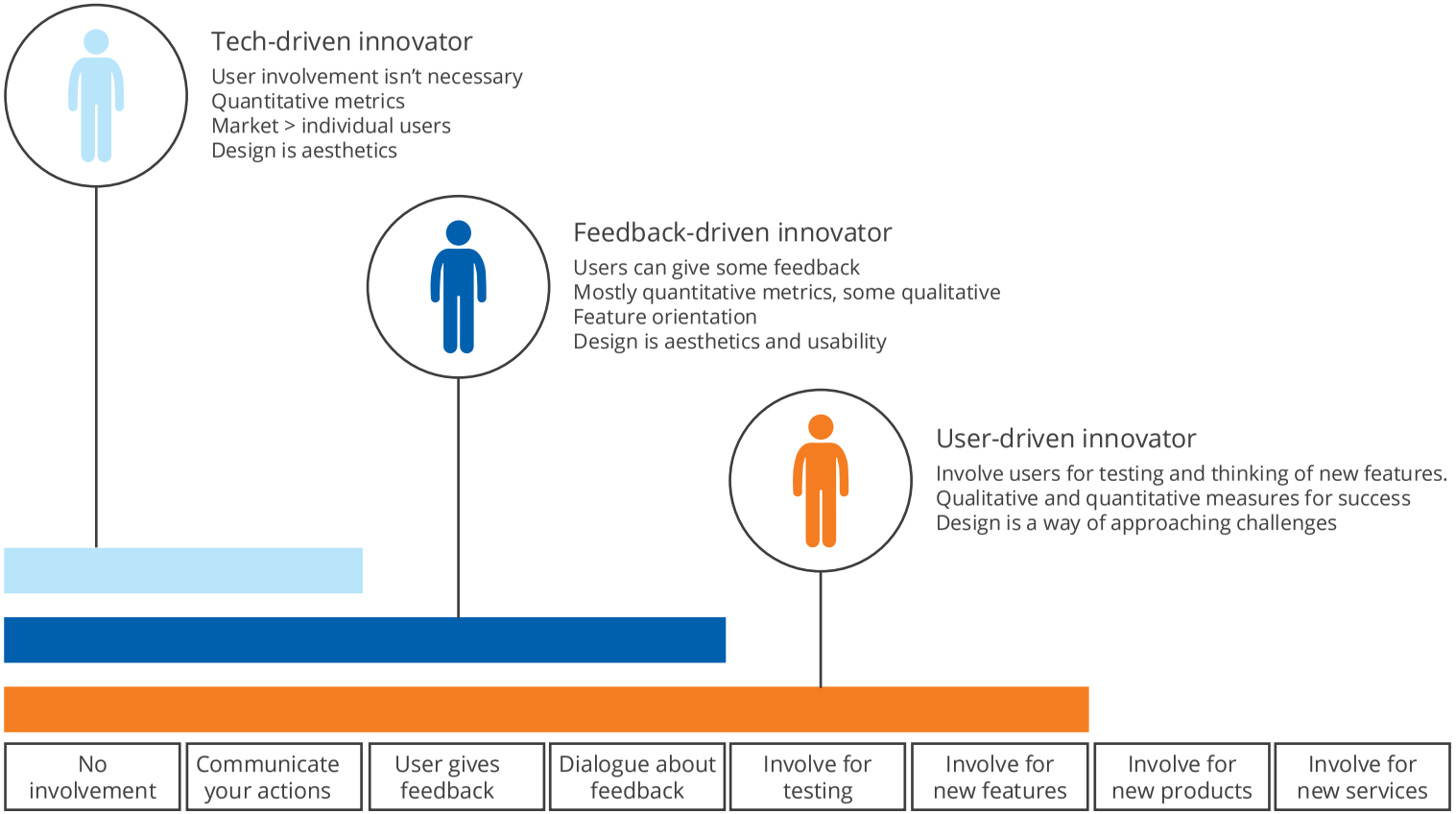


Figure 11: Goals of user involvement for the three defined attitudes

4.4.3 Barriers to implementation of (user-centred) design practices

The data from the exploration suggested that there were a number of barriers preventing the company from fully implementing design practices for product improvement. The catalyst developed a model displaying the interactions between these barriers. This is shown in figure 12.

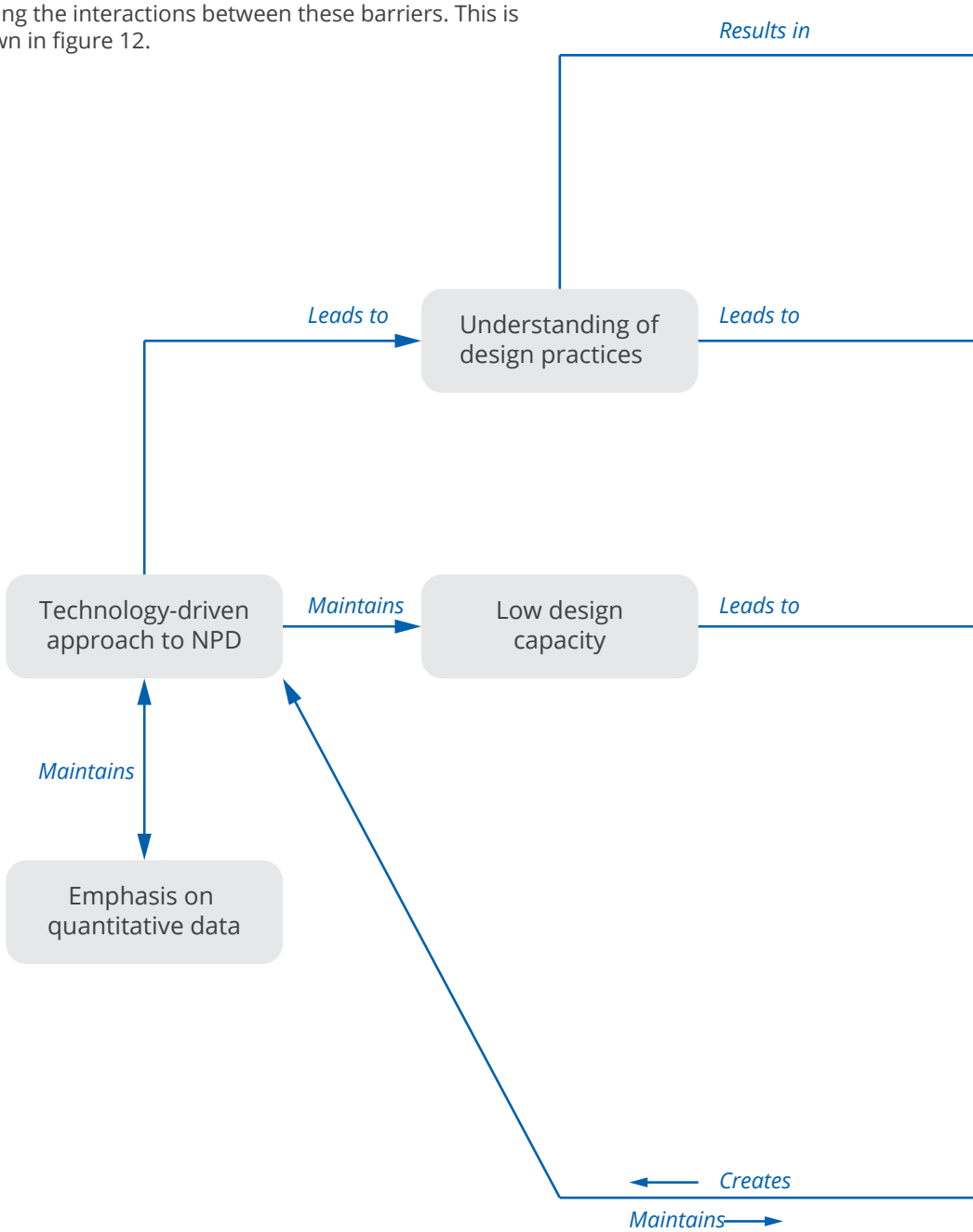
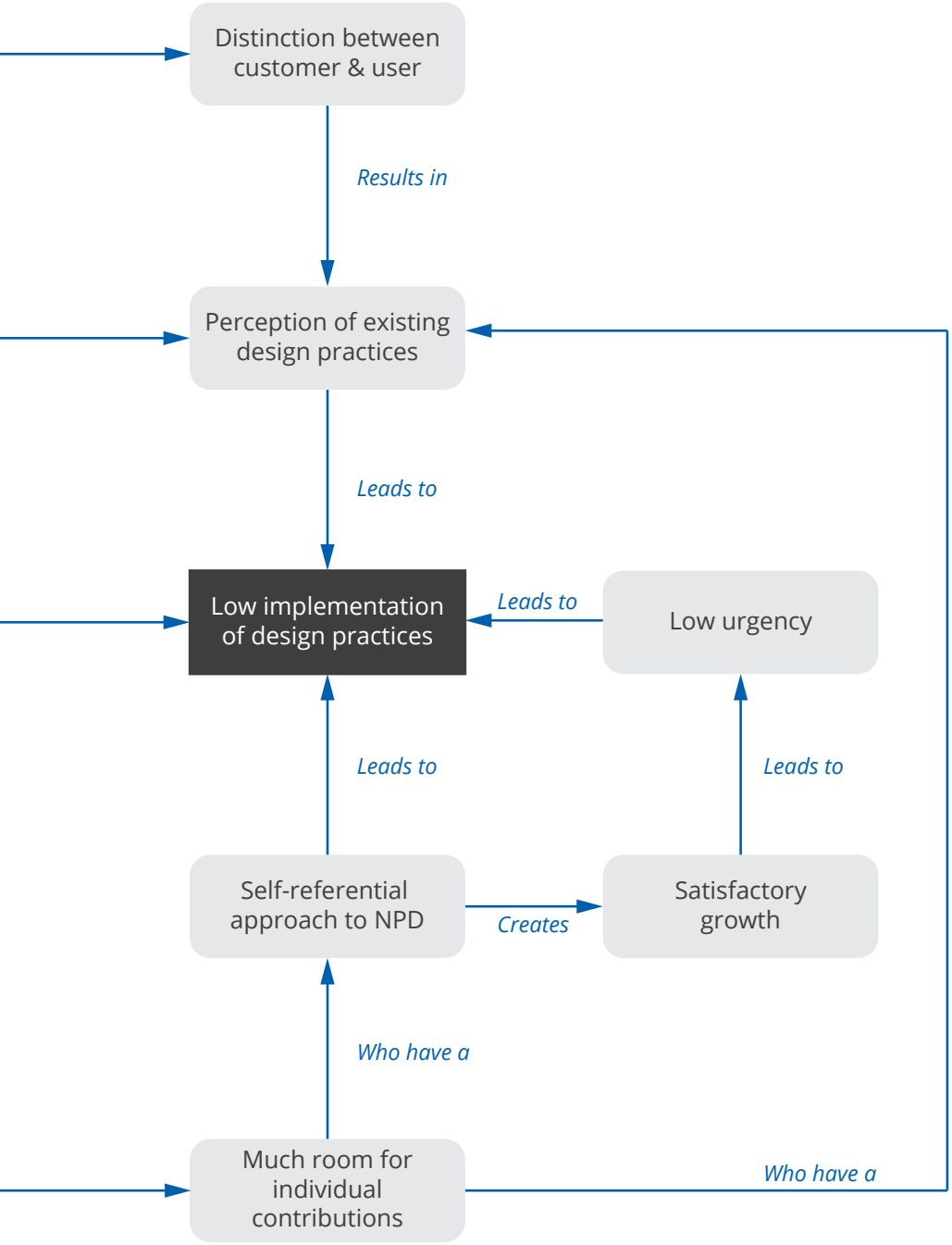


Figure 12: Interactions between the barriers to the implementation of design practices


Distinction between customer & user
Results in
Perception of existing design practices
Leads to
Low implementation of design practices
Leads to
Low urgency
Leads to
Leads to
Self-referential approach to NPD
Creates
Satisfactory growth
Who have a
Much room for individual contributions
Who have a

Emphasis on quantitative data

The data gathered from the interviews suggest many employees in the company preferred quantitative data over qualitative data. Quantitative data is valuable to a company because it creates easy to understand metrics of performance. However, quantitative data often captures human-product interaction on the level of behaviour, which although closely related, is not the same as product experience. Desmet & Hekkert (2007) argue product experience may seem simple, but in fact is the result of complex interactions between humans, products, and contexts.

The quantitative performance measures applied by CM such as the number of registrations, conversions, and net-promotor-score, thus provided the company valuable information, yet did not provide rich insights about product experiences. Adding qualitative data from sources such as usability evaluations would substantially enrich this data.

Technology driven approach to new product development (NPD)
It becomes clear that CM innovated driven by technological opportunities, even though differences exist between departments. Examples of these innovations are upcoming payment methods such as iDeal payments using a QR code. This technology-driven approach allowed the company to work at the forefront of innovation and develop experience with technologies that are the foundations of products and services shaping the next product horizons.

However, as the market for software development is volatile (Morinville & Quinn, 2016), one could argue market competitiveness can be supported by a vision-driven product development strategy such as design-led futures (Evans, 2011), or time-pacing (Eisenhardt & Brown, 1997). Although a notion of this had already found its way into the company's strategic business plan, it is important product development strategies get connected to this vision.

Distinction between customer and user

Interviewees discussed CM was continuously in dialogue with many of its A- and B-tier customers. This conversation happened through sales managers and at informal events. This ongoing conversation provided the company with feedback on CM's performance and product portfolio, supporting improvement and scoping for new product development.

This conversation led to the impression amongst many that the company received feedback from users, whilst a stark difference between users and customers exist. This is especially true in business-to-business markets.

Whilst the customer's representative may express the difficulties his or her colleagues face in using the products, he/she has no first-hand experience with the product, so he/she will not be able to get to the details of where the actual pains are. This challenge is also signalled by Lárusdóttir et al. (2016). Therefore, if CM wants to build a thorough understanding of the product's user experience it needs to find a way to overcome this hurdle.

Room for developer's contribution

One developer stated she picks her projects on a combination of urgency and fun. Another stated that when having a good idea, the head of software development provided him much room to work on this.

Providing developers room to follow their own interests works well in providing people with a sense of value in the company, but it may also leave CM vulnerable. This vulnerability stems from the potential that newly developed projects or products may drift away from the company's vision and do not add to the company's overall value proposition.

In the long-term this approach may lead to a highly diversified product portfolio which doesn't accurately represent CM's vision and strategy. Rae (2013) notes design insights can support portfolio expansion because it finds value propositions that both address (unmet) user needs and align with CM's vision.

Understanding of design practices

Many of CM's employees perceived design as a downstream styling method or as a tool that helps to define user flows through products which allows a better user experience.

As a result, many saw the design toolkit as filled mostly with tools for aesthetics, thereby overlooking an array of tools for user research and strategy. Unawareness of these tools influenced the limited perception of design's added value to CM.

Satisfactory growth & low urgency

CM performed very well at the time of the research. It was privately owned and free of external funding. The company grew in both revenue and employee numbers. Furthermore, the company partially secured this growth through acquiring other firms.

Adopting or developing design capabilities might be interpreted by employees as an indication that existing processes are not effective or valued by the management. Therefore, it is logical to assume that there is hesitation or resistance to the idea that developing design capabilities would be a valuable addition to CM.

However, growth will eventually level out, either because adoption of products or technologies has reached a point of saturation (Kaminski, 2011) or because paradigms have shifted and new futures have emerged (Curry & Hodgson, 2008). In order to prevent growth from levelling and to remain relevant in future contexts, companies need a steady stream of innovations that helps them maintain relevancy and facilitates growth.

Low design capacity

At the time of the interviews, CM employed one full-time designer and two part-time designers. As the company's product portfolio includes 36 products, excluding websites and its self-service platform, interviewees expressed the design capacity to cover all of these products was insufficient.

Designers themselves noted they faced difficult decisions on spending their time. Either covering all products on a very shallow level, leaving details untouched, or working on only a small set of the product portfolio, leaving many products without any attention from design professionals.

Adding responsibilities such as user research to this would make their schedule even more fragmented and might even be detrimental to the aesthetic quality of certain products.

Self-referential approach to NPD

CM strongly believed in their own knowledge and expertise in product development. Deciding what needs to be improved in products was often driven by personal judgments. An often-expressed reason for this is that employees can find much to improve from personal evaluation.

Although not all improvements require users to be involved and common sense may already provide leads for product improvement, it does not mean the user should only be involved if CM runs out of ideas themselves, as CM's managing director argues.

The main argument against a self-referential approach is what is called 'the curse of knowledge' (Heath & Heath, 2006), arguing the receiver of the information provided (i.e. the product's user) will not know as much about your product as the sender (the firm that sells the product) knows, resulting in a knowledge discrepancy on use and usability.

Perception of current NPD practices

Employees at CM perceived CM's NPD practices as user-centred. In part, this holds true, as CM moved beyond a purely technology-driven approach into an approach which considered the user's needs. One developer in particular outlined this way of working, noting his team understands users do not like it when the product they use does not work well. For example; when the flow through an application is confusing or not easy.

The developer expressed he knew this made users unhappy and also unnecessarily bothered the support department, who had less time available to solve technical problems. Therefore, they see it as their task to prevent user unhappiness. They execute this task by making products that they feel are logical to the user.

This shows that CM had already made a shift away from a purely technology-driven approach by considering user needs. A next step for CM to take would be to move from developing for the user to developing with the user, which requires a continuous loop of feedback between CM and the user to understand what can be improved.

4.4.4 Assessment of CM on the Danish Design Ladder

The observations discussed in this section allowed for a two-sided assessment. The first made an assessment of CM's mindset with regard to design capabilities, while the second focussed on CM's performance.

The survey results, captured using the Design Capacity Model, shown in figure 10 (page 43), showed that the company's mindset had a certain acknowledgement of the low extend to which users where involved with CM. The interview findings reflected this, as many interviewees agreed that users were not involved. The interview findings also showed no conformity existed about the importance of user involvement to the product development process.

Additionally, the results showed many discussed the design professionals' role in improving CM's competitive position to make aesthetically pleasing products and translating product teams' ideas to well thought-out graphics.

Based on the assessment of the company's mindset, CM reached the second level of the Danish Design Ladder (Kretzschmar, 2013), which is described as design being concerned with the visual appearance of products, carried out by both design professionals and non-design professionals.

Upon reflection, CM's stance on the Design Ladder could be seen as lower. Although many employees perceived CM's design performance somewhere along the lines of "not very well, but not terrible either", a more objective perspective revealed this position may be an overestimation.

Two reasons were proposed as the foundation for this overestimation. First, many decisions on product development did not incorporate the end-user's views. Generally, this happened because CM relied strongly on their own abilities

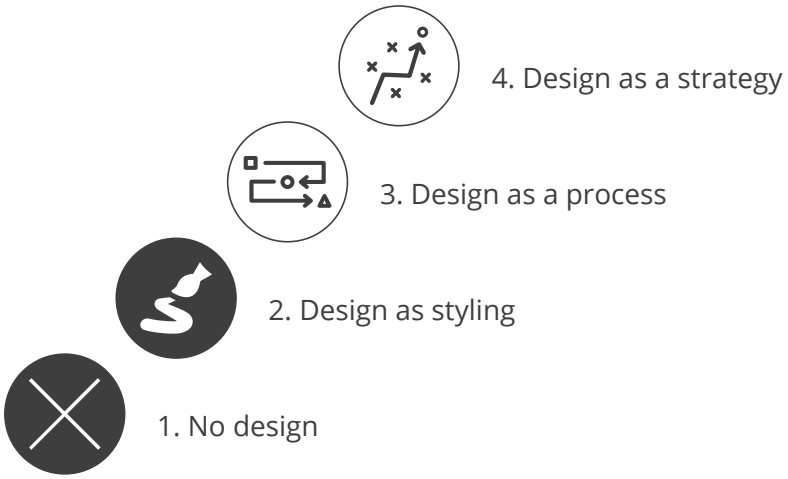


Figure 13: CM's position on the Danish Design Ladder

and involving the user in a dialogue on product development or improvement was not embedded in the organization.

Secondly, the small number of design professionals at CM forced non-design professionals to develop the product's appearance. As a result, design was more often carried out by non-professionals than professionals.

Altogether, it could be argued that CM achieved the second level in the design ladder, albeit the current state did not provide a solid base to work from. The motivation for this view is the mindset expressed by employees in both the survey and the individual interviews, which shows an organization where design was largely perceived as a downstream styling tool. Only a few in the organization looked upon design as the continuous process described by the World Design Organization.

Although CM's mindset had arguably reached the second tier, CM was held back in its design performance by the low design capacity.

The following section will discuss the first steps CM can take in moving from the second to the third tier in the design ladder.

4.5 Implications for the catalyst's next actions to build design capacity

Given the findings discussed previously, CM was very suitable for a transformation from seeing and applying design as a tool of styling to valuing design as a process to support opportunity-finding and problem solving, as many employees felt product performance exceeds technical performance, and to a certain extent welcomed outside perspectives.

This section presents the first steps the catalyst proposed in order to make this transformation. It first briefly describes what previous DICs have discovered to be steps between the second and third tier in the Danish Design Ladder, after which it discusses the proposed actions the company had to take.

4.5.1 Intermediate steps in the Danish Design Ladder

When companies are trying to move from the second to the third tier in the Danish Design Ladder, they would have to take three stepping stones, shown in figure 14 (Doherty, Wrigley, Matthews, & Bucolo, 2014).

These three stepping stones are:

- **Design as Thinking:** The company sees design as an approach to solving problems.
- **Design as value creation:** The company recognizes design creates value for all stakeholders instead of being a downstream tool for styling and solution-finding.

- **Design as intangible:** An acknowledgement that design project's outcomes are not necessarily tangible and sometimes ambiguous to measure in traditional methods such as return on investment.

The findings discussed in the previous section, combined with the three stepping stones, led to a set of first steps for the company to take in further developing design capabilities. This set of first steps for CM consisted of two boundary conditions to be met and two product development propositions aimed at supporting design thinking principles to develop at CM.

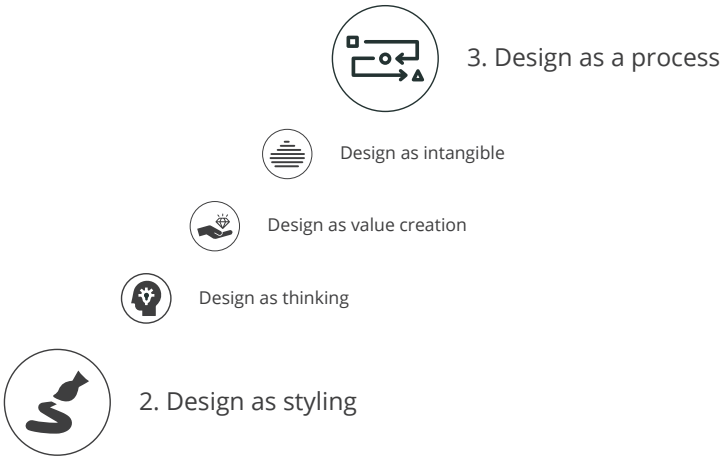


Figure 14: Cultural stepping stones in the Danish Design Ladder, adapted from Doherty et al. (2014)

4.5.2 Boundary conditions

In order for the company to be able to make the intermediate steps in moving from the second to the third tier in the Danish Design Ladder, the company had to meet a number of boundary conditions. Meeting these boundary conditions would provide the company with a solid base at the second tier in the Danish Design Ladder. Achieving this would create a good starting position to build on.

Boundary condition 1: Increased awareness of design's added value.

The sense of urgency at CM to change the way of working was found to be low. Which was to be expected, due to CM's economic success. In order to seduce people to change their way of working, the added value of a new practice needed to be made apparent to persuade people to take a leap of faith.

As the chances of a successful implementation of design practices increase substantially with an endorsement from management stakeholder (Pozzey, 2013), CM's management needed to be addressed in particular.

Whilst Pozzey investigated a family-led manufacturing firm, rather than a software SME, CM was privately owned self-funded by the founders who held roles as CEO and managing director in the company. This made their role within CM with regards to decision-making and strategy-definition similar to managers in family-led businesses. This made it equally important to receive their endorsement as it was in Pozzey's family-led business.

Boundary condition 2: Increased design capacity.

As noted, design capacity at CM was low. The company employed one full-time designer and two part-time designers during the first round of interviews, all of who focussed on product styling.

The designers themselves noted being in a difficult position, as they were forced to choose between either covering a few products into detail whilst other received little to no attention, or covering a lot of products, but leaving many details for individual developers.

Neither of these situations were desirable because both would result in a product portfolio lacking coherent styling, thereby leaving customers confused or perceiving CM as unprofessional.

Furthermore, reaching the third level in the design ladder required a solid base with design implemented as an aesthetic tool.

Addressing the challenges discussed above required CM to substantially increase the design capacity in the organization.

4.5.3 Proposition 1: Engage with the user to inspire the NPD process

As CM engaged with users on an irregular basis, the product innovation process followed a largely self-referential approach, lacking outside evaluation. Conversations with the employees and management uncovered two major reasons behind CM's reluctance to involve users:

- The notion CM could define enough improvements based on internal evaluations and,
- the expectation that user involvement would inevitably lead to tailor-making solutions. This did not align with the company's vision of standardization.

However, engaging with users is key to improving their product experience. Users can reveal more about the way they use a firm's products. Engaging with users can discover their delights and frustrations better than CM's employees would ever be able to imagine. Therefore, the company needed to look outward and have their own knowledge and expertise enriched by engagements with users.

The biggest challenge in this was to strike a balance between going out to understand the user's needs, wishes, and difficulties in product usage on one hand, whilst maintaining a sense of freedom amongst employees to make choices about products on the other hand. The insights gathered by the methods that would be applied would thus have to inspire employees, rather than dictate product innovations.

Another obstacle that would have to be overcome was the perception that many employees held that doing user or usability research is highly time-consuming and that it goes at the expense of daily activities. Therefore, employees had to be shown that doing basic-level research was not very complex or time-consuming. This required providing design workshops in which the catalyst explained simple techniques and provided tools so employees could carry out small-scale usability evaluations.

Another challenge to overcome was the existing idea that insights gathered through small-scale usability evaluations were a critique on an employee's work. The catalyst had to encourage employees to view feedback as input inspiring their next product improvements. This meant searching for a way in which the feedback shared would inform as many stakeholders as possible, whilst not being perceived as a public insult to individuals.

4.5.4 Proposition 2: Developing an in-context understanding of the product portfolio

One of discovered strengths of CM was the encouragement it provided to employees to explore new products and new product features. However, limited structures existed to provide knowledge about developments in the markets and industries in which the company was active.

New product development was therefore mainly driven by technological opportunities combined with individual interests. The company may become exposed to the risks of having an incoherent product offering that may lead to the blurring of the carefully defined company and brand identity as a result of this.

The company therefore needed to find ways to create an understanding of the products and services it offers in relation to each other in some way. This would ensure a better fit between innovations and the product portfolio, resulting in a higher chance of success, whilst minimizing the divergence from the newly defined brand identity. Another chance this would bring was the ability to identify products that did not fit the portfolio and could either be discontinued or repurposed to branch out the company.

In order to capitalize on this strength, the catalyst proposed to develop means to bring information on the developments in markets in which the company was active towards product development teams.

One way proposed were market-focussed updates, in which sales representatives gave short presentations about the market in which they specialized to product-development teams. Important in this was to make these sessions feel as a source of inspiration rather than the issuing of guidelines for product development, as this opposed the company's strength that allows everyone to pursue their own interests.

Another means proposed were design workshops in which employees and product teams were encouraged to develop an understanding of their product's context. This meant defining the product's target audience as well as the core qualities which make the product as successful as it is.

4.6 Summary

The findings from the exploration of the company's culture and its design capabilities aligned largely with what the catalyst's supervisor described at the start of the catalyst's engagement with CM. CM experienced growth and acknowledged it could no longer rely on just selling technical products if it wants to remain competitive in a global market.

CM had taken the first step from purely technology-driven products towards their goal of becoming a globally recognized brand for innovative and reliable solutions for businesses. They did this by defining the brand's core values and value proposition in the branding exercise it carried out in 2016. In this exercise, CM furthermore aligned the brand's visual identity to the findings of the exercise. It could therefore be argued, the company rightfully acknowledged investing in their design capabilities could support CM in taking steps toward that goal.

The catalyst's investigation into the existing barriers to developing design capabilities discovered the company considered users in its product development process, but only to a limited extent. The company did not involve users to gain deeper understanding on possible product improvements or other forms of value creation.

CM was also held back in the development of design capabilities by the growth the company experienced. This made employees hesitant to adopting new ways of working. Another substantial barrier discovered was the small number of design professionals employed by CM.

The catalyst concluded CM was ready to take steps toward becoming a firm where design is employed as a strategic tool for opportunity discovery, value creation, and problem-solving, next to a tool to create aesthetically pleasing and highly usable products.

The first steps proposed by the catalyst were: 1) Engaging with users to inspire the NPD process. Not only to understand how existing products may be improved, but also to learn other means to create value for customers. And 2) to develop an in-context understanding of CM's product portfolio. This would enable CM to develop new propositions that align with existing products, thereby minimizing the risk of blurring the recently developed brand identity.

Taking these steps, also required the company to meet two important boundary conditions. The first was to increase the understanding of the design practice, as many at CM perceived design as a downstream styling tool to translate technology-driven innovations. Increased awareness of design's added value helps the adoption of design practices. The second was increasing the number of design professionals at CM, which would enable CM to meet the markets basic demand for products with a positive user experience.

The next chapter describes the catalyst's actions in order to support CM in meeting these propositions and boundary conditions.

5. Building design capabilities in CM

This chapter describes the catalyst's actions to build design capabilities in CM. The actions were inspired by the first steps proposed in section 4.5. The section starts by presenting the catalyst's actions over the period in which the catalyst was embedded in the organization on a timeline. This is followed by a more detailed description of these activities.

5.1 Timeline

The project consisted of three main phases. In phase 1 the catalyst explored CM through conversations and the survey, In the second phase, the catalyst worked with CM's employees to build design capabilities through design workshops and engagement conversations. The third phase was used by the catalyst to reflect on his impact in the organization, whilst in parallel still actively engaging with employees to support them in building design capabilities.

Figure 15 shows the project timeline and notes the major interactions the catalyst had with CM's employees throughout duration of the project, with weeks in which a milestone was reached event marked in orange. Table 9 (page74) briefly discusses the different types of engagement the catalyst had. A large version of the timeline is available at the back of the report.

Table 8 (pages 72-74) provides a more detailed outline of the activities. The design workshops marked in dark blue are further discussed in section 5.2.1.

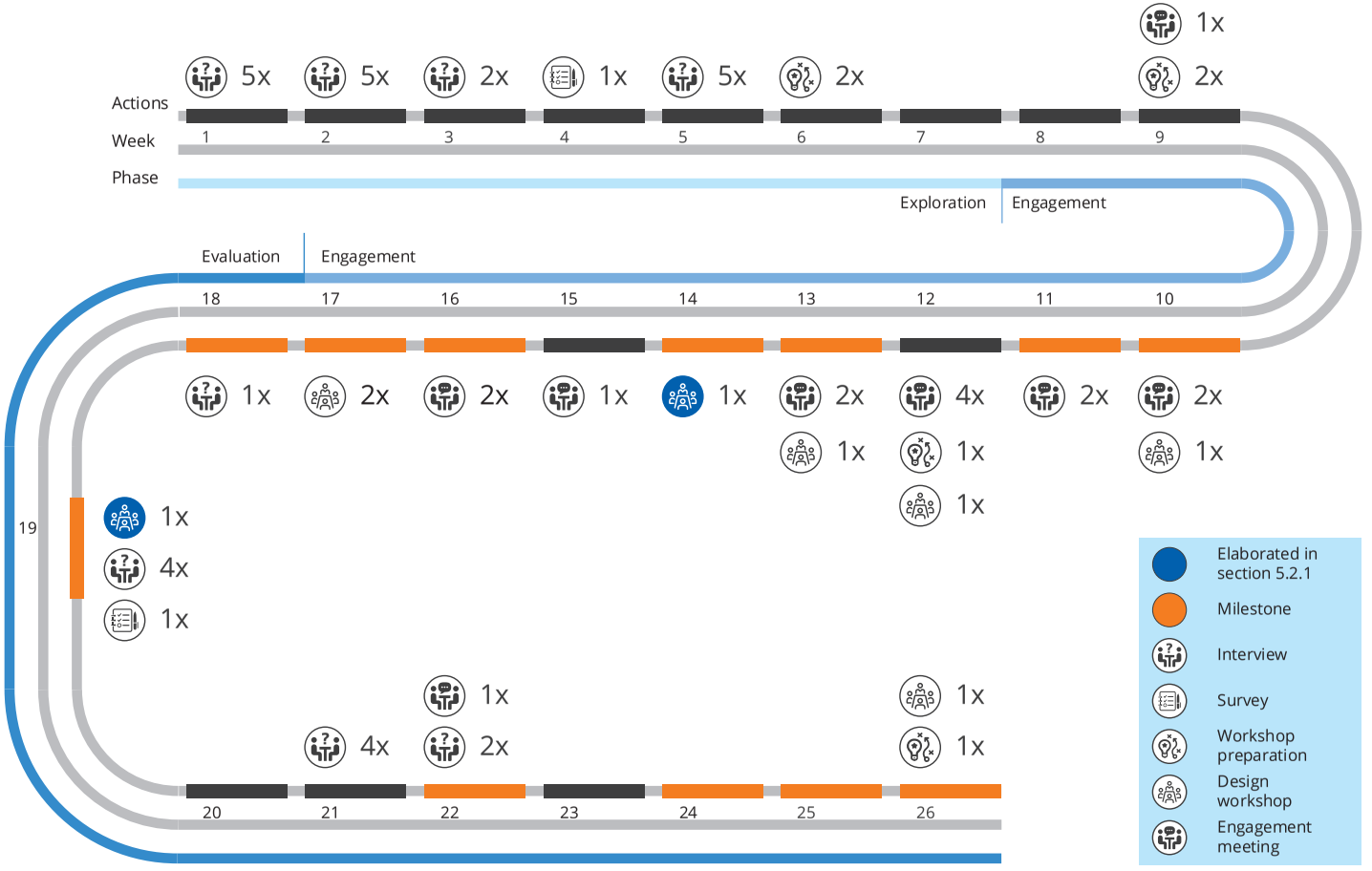


Figure 15: Project timeline

Week	*Activities*	*Description*	*Focus*
1	Interviews (5x)	Interviews to explore the company's culture and approach to product development. (Average length ~1 hour)	Explore the company culture, understand barriers to adoption of design practices.
2	Interviews (5x)	Interviews to explore the company's culture and approach to product development. (Average length ~1 hour)	Explore the company culture, understand barriers to adoption of design practices.
3	Interviews (2x)	Interviews to explore the company's culture and approach to product development. (Average length ~1 hour)	Explore the company culture, understand barriers to adoption of design practices.
4	Survey (1x)	Distributed the first round of the survey. 77 responses were collected.	Explore the way CM perceived its own design capabilities
	Customer visit	The catalyst joined one of the designers to visit a customer that experienced problems in using CM's products (~1 hour).	Discovering the customer's problems and understanding how CM could mitigate these.
5	Interviews (5x)	Interviews to explore the company's culture and approach to product development. (Average length ~1 hour)	Explore the way CM perceived its own design capabilities
6	Workshop preparations (2x)	Together with 2 product managers the catalyst discussed how his work could benefit them (~30 minutes each)	Both focussed on how the team could engage with users to improve usability.
7 8	Data analysis	Analysing the interview and survey data	Understanding the barriers to adopt design practices that existed in the firm
9	Workshop preparations (2x)	Engagements with a product manager and marketer	Understand how the company could build a more in-context understanding of the product portfolio
	Engagement meeting	Discussed the findings of the data analysis with an employee in the finance department (~30 minutes each).	Find out if he recognized some of the findings done by the catalyst
10	Engagement meeting (2x)	Met with the CMO and a product manager (~30 minutes each)	discuss progress and findings
	Design workshop	Workshop with a product team (1 hour)	Explain benefits of user involvement

Table 8: Catalyst activities per week (1/3)

Week	*Activities*	*Description*	*Focus*
11	Engagement meeting (2x)	Presentation to the Marketing team (30 minutes)	Update on progress and findings
		Meeting with product manager (30 minutes)	Build in-context understanding of product portfolio
12	Engagement meeting (4x)	Engagements with 2 marketeers, somebody in HR and a product manager (~30 minutes each)	Update on findings. 1 person was asked for feedback on the report
	Workshop preparation	Prepared a workshop with a product manager (1 hour)	Go over the script for the workshop in week 13
	Design workshop	Workshop with a product team (2 hour)	Explain benefits of user involvement
13	Engagement meeting (2x)	Met with product manager (30 minutes) and a financial analyst (1 hour)	Discussed intermediate report with financial analyst, discussed findings with product manager
	Design workshop	Workshop with a product team (2 hours)	Start redesign for the registration of an App
14	Design workshop	Workshop with a project team (2 hours)	Fill out a value proposition canvas
15	Engagement meeting	Met with CM's CTO (~30 minutes)	Find out if he recognized some of the findings done by the catalyst
16	Engagement meeting (2x)	Individual meeting with head of software development (30 minutes) Presented progress in weekly meeting of the marketing team (30 minutes, including questions)	Update on progress and next steps.
17	Design workshop (2x)	Workshop with 2 project teams (1 hour each)	Kick-off for DIY usability evaluations
18	Reflective interview	Interview with CM's CMO (30 minutes).	Interview as part of the reflection.
19	Design workshop	Workshop with a project team (1 hour)	Discussed insights from usability tests
	Survey	Distributed the first round of the survey. 79 responses were collected. (full day)	

Table 8: Catalyst activities per week (2/3)

Week	*Activities*	*Description*	*Focus*
19	Reflective interview (4x)	Interview with 4 employees, average length ~30 minutes	Interview as part of the reflection.
20	Holiday	The catalyst had a brief holiday	N.a.
21	Reflective interview (4x)	Interview with 4 employees, average length ~30 minutes	Interview as part of the reflection.
22	Reflective interview (2x)	Interview with 4 employees, average length ~30 minutes	Interview as part of the reflection.
	Engagement meeting	Met with a senior sales representative (~30 minutes)	Discussed possibilities for Sales – Development meetups for information exchange
23	Data analysis	Processing interview results	Discover changes in attitudes for individuals
24 25	Reporting	Report on the research findings	Make a final draft for proof-readers
26	Workshop preparation	Met with a product manager and a product marketeer (~30 minutes)	Prepared workshop for a product redesign
	Design workshop	Workshop with a project team (~1 hour)	Find directions for a product redesign

Table 8: Catalyst activities per week (3/3)

Type	*Definition*
Milestones	Milestones were defined as a powerful indicator of organizational change. Although not all of these events were direct interactions between the catalyst and employees, they were considered a cumulative result of the catalyst's efforts. These events are further discussed in section 6.2
Design workshops	In design workshops, the catalyst led a workshop with employees that aimed to foster a more user-centric attitude in the product development process.
Workshop preparations	The design catalyst together with one or more employees developed a format for the design workshop. This included defining length, time, tools and goals.
Engagement meetings	The catalyst held meetings with key stakeholders in CM, such as the CTO and the head of software development in order to maintain support from leadership or to reflect on findings with someone with an insider perspective.
Interviews	The interviews served to investigate CM. Interviews were one-on-one meetings between the catalyst and an employee.

Table 9: Major interactions between catalysts and employees

5.2 Catalyst activities to build design capabilities

This section introduces the catalyst's activities in the company more in depth. It does so by further describing the main activities described in table 8 (pages 72-74). The section starts with the design workshops. After that, it describes the personal engagements and other activities. The milestones are described in section 5.3.

5.2.1 Design workshops

Three product teams were involved in a set of design workshops led by the design catalyst. Two of these product teams voluntarily approached the design catalyst to lead a design workshop. A third team was advised by CM's managing director to get in touch with the design catalyst because they wanted to improve their product. In total, 8 design workshops were held with the three teams.

Before each workshop, the catalyst hosted meetings with one or two representatives of the product teams in order to explore the challenges they wanted to address and what they wanted to be the outcome of the workshop. Examples of such outcomes included a redesign of a registration process or an improved understanding of the user.

The workshops focussed on one of the two proposed first steps as defined by the catalyst. An example of each type of these workshops are given on the following pages.

Workshops focussed on user engagement

The catalyst hosted most of the workshops with the goal of teaching product teams to engage with external sources in order to inspire their NPD process. The workshops were either meant to prepare for engagements with users, or as a moment to reflect on the outcomes of an (externally sourced) usability evaluation. An example of such a workshop is provided in Case 1

Workshops focussed on creating an in-context understanding of the products

In the other workshops, the design catalyst focussed on helping project teams build an understanding of their product's context. This was done through making the teams describe their users, or do a brainstorm about motivations users had behind using the product. Case 2 provides an example of one of these workshops.

Goal

The goal of the workshop was to discuss the outcomes of an externally sourced usability evaluation.

Outcome

The outcome of the meeting was a set of ideas on how to improve the company's website through both short- and long-term development goals

Preparation

The design champion bought in a usability evaluation of the firm's newly launched website. This provided a set of 5 short clips, showing people do a usability evaluation of the website, based on a scenario provided by the design
champion.

The project team was then asked to review these clips and share their insights with the design champion and catalyst, who collected these and prepared cards with these insights for discussion during a plenary session.

Workshop

The workshop lasted roughly 45 minutes. The first exercise the product team was asked to do was categorize the cards that had the insights written on them. This was done in a plenary method where the text of the card was read out loud and the team decided in which category it belonged.

Then the team reflected on the two largest categories to figure what may be the causes behind these observations.

After the discussion, each member was given two stickers which could be used by the participants to vote for one observation that they considered would be easy to fix and one observation they considered the most valuable thing to fix.

Based on the votes cast for insights a discussion was held about how these issues could be resolved and how they could be prioritized.

Case 1: Workshop on usability evaluations

Goal

The goal of the workshop was to have a product team fill out a value proposition canvas to understand who the products users are and why they use the product.

Outcome

The outcome of the meeting was a set of ideas for product improvements based on the ideas expressed by the participants, as well as the value proposition canvasses produced by the participants.

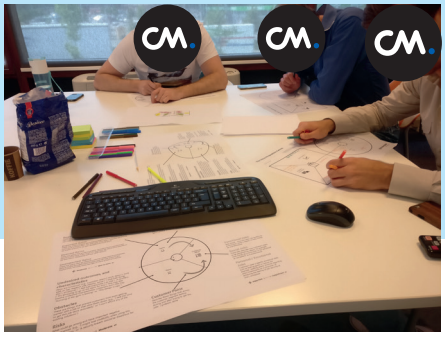
Preparation

The design catalyst printed out a blank value proposition canvas for all participants so they could be filled in during the workshop.

Workshop

The workshop lasted two hours and started with a game of Pictionary in order to remove creative inhibitions the participants might have. After that, the catalyst gave an introduction of the value proposition canvas using a short movie as well as an example of a filled-out version.

Afterwards, the participants were given the time to fill out a value proposition canvas themselves, based on their own ideas of the products value proposition and the target audience. Afterwards, the participants were asked to present their value proposition canvas to each other whilst the other participants could ask questions. The product owner took notes about the ideas he gathered from the presentations



Case 2: Workshop on the value proposition canvas

5.2.2 Personal engagements with stakeholders

During personal engagements with stakeholders, the catalyst entered in one-on-one conversations with employees on a higher level of seniority. As Pozzey (2013) notes the chances of success for a catalyst's work benefit from an endorsement from those in managerial echelons of the company. As the company was organized with as-little-as-possible hierarchy, the number of engagements was relatively low; a total of 13 meetings were held throughout the catalyst's stay in CM.

During these meetings, the catalyst presented his research' results and discussed his plans for the remaining time he would be at the company. These meetings were not only used as a way for the catalyst to inform stakeholders. The meetings were also intended to discuss the challenges the catalyst faced in his work in order to receive advice from the stakeholder. Another goal of the meetings was to motivate stakeholders for the catalyst's plans and to discuss the way these could be executed.

5.2.3 Other activities to build design capabilities

Apart from the workshops and personal engagements with stakeholders, the design catalyst engaged in other activities to support the company in developing design capabilities. The activities mostly concentrated around helping the company meet the two boundary conditions set out in section 4.5.

Increasing design capacity in the company

The design catalyst, together with the design champion prepared a note to the company's management. In this note they outlined the types of design professionals they saw the company could hire on both a short- and long term in order to increase the design capacity. These hires would raise the design capacity to a level where all activities relating to product usability and aesthetics could be executed by design professionals. The management reacted positively to this note by agreeing to create job openings and start hiring design professionals.

The design catalyst supported the HR department with developing a profile for these job openings and worked together with them to recruit designers. As the catalyst had an outsider position in the company, he was not involved further in the application process.

Increasing awareness of design's added value to the company

An important challenge to ensure the catalyst's success was for the catalyst to invite employees to see the added benefits design could bring to the company. Next to personal engagements with individuals, the catalyst used a channel in CM's social intranet to share relevant knowledge and articles about design. These articles mostly concerned the impact of design on business and the value of user research in product development.
These articles were intended to provide information to people in the company, without specifically forcing people to read them. A list of the articles can be found in appendix F.

5.3 Milestones

Throughout the research, 12 events were marked as milestones, because they signalled change in the company. The first event that marked a milestone was the catalyst's meeting with CM's management team. During this meeting, the catalyst was asked to present his findings from the first phase of his research. This event was marked as the first milestone because it was the first time CM's management was informed in depth about the catalyst's work. Thus, this was marked the meeting that sparked managerial change in the organization. An overview of these events is provided in section 6.2.

5.4 Summary

This section has shown the richness and diversity of the catalyst's actions to build design capabilities within CM. The baseline of the catalyst's engagements can be described as follows:

Bottom-up activities combined with top-down awareness:

The catalyst sought to build design capabilities by working with project teams to support them in using design tools. The catalyst did this through the design workshops. In parallel, the catalyst engaged with CM's management to raise awareness of the added value of developing design capabilities.

This combination made it possible that when the management decided to improve the company's design capabilities, the project teams had the ability to act on this idea. This prevented that the management's decision was not understood and became a stillborn plan.
On the other hand, making CM's management aware of the added benefits that well-developed design capabilities could bring, led them to understand what individual product teams were trying to achieve. This made the company's management support rather than discourage these efforts.

Personal engagements combined with group activities:

In engagements with individuals, the catalyst could explain his research findings and explain the value of design capabilities. Next to that, he used this opportunity to inspire individuals about design workshops and help them find a way to apply them to their project. This way, individuals in product teams were intrinsically motivated to participate in a design workshop. This made it feel more as a valuable addition to their product development process instead of an activity they were engaging in just to please the catalyst.

In order to evaluate the impact of the catalyst's actions, he carried out an evaluation in the final weeks of his presence at the company. This is described in the next chapter.

6. Evaluation of the catalyst's effect on CM

This chapter describes the evaluation of the catalyst's impact on the organization. The evaluation was done through a combination of observations, interviews and a survey. The chapter first describes the method applied, after which it describes the results. A discussion of the results follows in chapter 7.

6.1 Method

The evaluation was done in three ways; observations made by the catalyst during his tenure at CM, a quantitative investigation using a survey, and a set of interviews. This section describes the method applied to make this investigation more in depth.

6.1.1 Observations

As this research was based on an action-research approach, the catalyst himself was involved in much of the research. Dick (2002), notes this process as a cycle between planning, action, and review. A lot of data was thus generated in the second phase of the research, in which the catalyst engaged with CM's employees to build design capabilities. Throughout the project, the catalyst maintained a notebook of his experiences and observations in the company, which formed an overview of changed behaviours and attitudes in CM.

6.1.2 Quantitative evaluation

To explore the changes that occurred in the organization during the catalyst's presence in the company, the catalyst applied a quantitative evaluation because it allowed for a cross section of CM, and the possibility to compare the attitudes of those that were and those that were not involved in the catalyst's work.
The quantitative evaluation followed the same method as used in the explorative phase, described in section 4.2. A detailed description of the questionnaire and setting can be found there. This section elaborates on the major differences between the two rounds, the participants and the process.

Participants

79 employees were randomly approached to fill out the survey. All filled out the survey. Using Barlett et al.'s method this number was determined to be sufficiently robust. Table 10 displays the distribution of the respondents over the 5 departments used for the explorative survey.

Department	*Respondents*	*Total employees*
Development	32	44
Marketing	8	18
Sales	10	14
Support	6	16
Other	23	85

Table 10: Distribution of participants and employees

Questionnaire

Storvang et al.'s Design Capacity Model was used for the survey. As was the case in the first round of data collection, the participants were again asked to list their department from one of the five predefined departments. A second addition was made to the questionnaire; a question asking the respondent to evaluate the frequency of his or her engagement with the catalyst.

Procedure

The results were collected using paper and pencil over the course of one day. This manner of distribution was intended to improve the response rate and allowed the catalyst to answer any questions respondents might have, or clarify ambiguous wording used in the questionnaire.

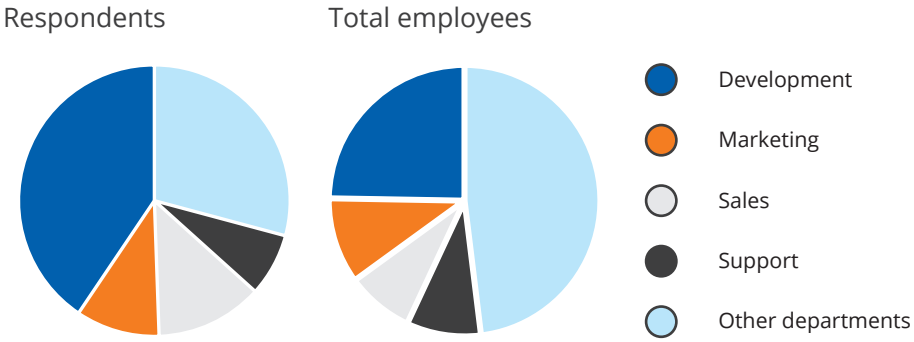


Figure 16: Distribution of participants and employees

The responses were processed using SPSS version 22. For each scale, the means were calculated for each department. The means were also calculated for each level of engagement (No/low engagement and high engagement).

Differences between the five departments in the second round of the survey were evaluated as well as between individual departments over time, and between the three different engagement levels (Before catalyst actions – No/low engagement – High engagement). It did this using independent samples t-tests and one-way ANOVAs.

6.1.3 Qualitative evaluation

Also for the qualitative evaluation, the approach was largely similar to the approach used in the first round of interviewing. The differences in the method used between the first and second round of interviews are discussed here. A more detailed description of the setting and procedure can be found in section 4.3.

Participants

In total, 11 employees were invited for an interview, of which all agreed to participate. All participants were involved with the research to some extent. Either because they were in the same department as the catalyst and therefore were passively involved, or because they participated in one or more design workshops. The interviewees all held different positions in the firm, on different levels of seniority. The most junior employee was a junior back-end developer. The most senior being CM's CTO. A full list of positions held by the participants can be found in appendix H.

Topics

The conversations were intended to discover if attitudes in CM had changed about design practices. The conversations were therefore approached using a 3-topic interview guide. This interview guide is available in appendix G. Apart from the three topics, each participant was asked to introduce him- or herself before the in-depth discussion of the specific topics.

The three topics were based on first three scales of the design capacity model; user involvement, awareness of design's value, application of design practices. These topics are discussed further below.

Topic 1: User involvement in product development

The third scale of the design capacity model discusses the involvement of users in the product development process. To find the participant's stance on this, questions were asked on how and when they thought users could be involved as well as questions to find out if the interviewee saw any potential challenges to overcome in involving users.

Topic 2: Awareness of design practices

As noted in section 2.1 and included in the results of the explorative research, the definition of design and design practices are not universally agreed on. This topic sought to discover how the participant defined design. The responses to these questions were compared to the findings in the initial explorative research.

Topic 3: Role of design in the organization

The second scale of the design capacity model asked the respondents how they saw the application of design in CM's practices. This topic was introduced into the conversation to find out what the participant saw as the role of design in the organization.

Setting

The conversations took place in the last weeks of the catalyst's presence in CM. Table 11 lists the number of conversations per week. All conversations were held at the company's main office in the Netherlands.

Week	*Interviews*
19	1
20	4
21	0
22	4
23	2

Table 11: Interviews per week

Procedure

The interviews were recorded and data gathering was done through both interview notes and a transcription of the interview. The data was then processed using thematic analysis as described by Braun & Clarke (2006). This method is discussed in depth in section 3.4.

6.2 Results

This section describes the findings from the three methods used to evaluate the catalyst's effect on CM. It first describes the observations, after which it describes the milestones. The section then presents the results from the quantitative and qualitative studies.

6.2.1 Observations

During his tenure at CM, the catalyst collected observations that reflected changes in attitude or behaviour in CM. These observations fell into three main categories, discussed below.

Design being placed on the management agenda

The catalyst spoke to CM's leadership on both informal and formal occasions such as the company's quarterly meetings and scheduled meetings to discuss the catalyst's progress and findings. In one of the meetings, the catalyst discussed his findings from the first round of interviews and the survey, after which the catalyst engaged in an open discussion with CM's leadership to discuss the potential developing design capabilities for CM.

As a result of these interactions, design found its way to the managerial agenda, who have decided to invest more heavily in design capacity in CM through both job openings and the allocation of resources for external product testing.

Moreover, CM's CEO proclaimed 2018 to be "the year of design" during CM's quarterly meeting. Thereby raising awareness for the value of design to the organization during many of the company's events.

Hiring of new design professionals

When CM decided to invest in design capabilities, the management's first point of attention was to increase the design capacity through the hiring of extra design professionals. The catalyst and his supervisor prepared a document outlining what types of design professionals would be the most suitable additions to CM in helping it reach its ambition.

This document was shared and discussed with CM's management that proposed a hiring plan to bring the design capacity to a higher level. The catalyst and his supervisor were actively involved in the recruitment and hiring process.
As a result, during the catalyst's presence in CM, a total of 3 new design professionals were hired. CM had the intention to hire another 4 designers over the course of coming year.

Proposal-related activities from individuals

As a result of the design catalyst's engagement meetings and workshops, a number of employees in CM took the initiative to start design workshops for their products. Some of them were smaller explorative sessions, whereas another lasted an entire day that involved a multi-disciplinary group of employees working closely together for the day to produce a high-fidelity prototype for a new product.

A product manager that was involved in design workshops throughout the catalyst's stay in CM took another initiative to make product testing a standard part of product development in his product team. The product manager made it mandatory for all of CM's new employees to participate in a user test as part of their introduction to CM. He argued that although it is not perfect, the new employees are less knowledgeable of the products and thus provide a less-biased product test. In the interview with the product manager he furthermore outlined that he wants to expand this approach.

In the final weeks of the catalyst's stay in the company, sales managers expressed interest in facilitating the knowledge sharing that was described in the catalyst's second proposal (section 4.5). The catalyst developed a plan to shape sessions where sales managers could share their knowledge with software development teams, this was described as one of the milestones.

6.2.2 Milestones

A total of 15 milestones were defined. This section lists these, in chronological order.

Week 10 – Meeting with CM's management team

During an hour-long meeting, the catalyst met with the company's management team. In this meeting, the catalyst presented the findings from his exploration of the company and discussed the next steps he proposed for CM.

Week 11 – CM decides to hire more design professionals

Based on the note the design catalyst prepared together with his supervisor, CM's management decided to create job openings to start hiring additional design professionals. The design professionals' jobs would initially be to align product aesthetics and improve product usability.

Week 11 – Management conducts a usability evaluation

Based on the catalyst's advice to have usability evaluations no longer done only by product development teams, the company's managing director made a video in which he conducted a usability evaluation of the registration process in the company's web-platform. This video was shared with key stakeholders in order to raise their awareness of the added value created by usability evaluations.

Week 13 – Meetings on recruiting and hiring design professionals

As CM's management had decided to increase the design capacity, through a set of additional design professionals, the catalyst was invited to join a meeting in which the profile for the new-to-hire design professionals was defined.

Week 14 – CEO announced 2018 to be 'the year of design'

During the company's quarterly meeting, in which all employees from all worldwide offices were present, the company's CEO discussed the value of design to the company. He used the quotation "everybody is a designer" to underline this. He discussed that in CM's ambition to rank amongst the most human high-tech companies, design would have to start playing a bigger role in the company.

Week 16 – Externally sourced usability evaluation

The catalyst's supervisor encountered some resitstance in engaging people to do a usability evaluation themselves through a nano-UX test (Kuniavsky, 2012). Therefore, he decided to buy a set of 5 usability evaluations through an online platform. The movie clips that were delivered as a result were shared with the project team. The movies were also shared with CM's management, who saw a valuable contribution to their product development process in them.

Week 17 – First designer hired

Only four weeks after the design catalyst had met with the HR department to develop a profile for new design professionals the first designer was hired to the company.

Week 18 – One-day design workshop

One employee had positive experiences with a design-workshop led by the design catalyst, and when he had to develop a new feature, he asked the catalyst's supervisor to lead a one-day workshop to develop a prototype for this feature.

Week 18 – More designers hired

After the company had hired the first design professional, the company was quick to hire two more. One of these designers started working in CM in week 20. The company expressed interest in hiring another design professional.

Week 19 – Second externally sourced usability evaluation

Based on the successes from the first evaluation, the catalyst's supervisor bought in a second external usability evaluation. This time, the tasks given to the participants were defined together with product managers to help them in their product development. The results and findings were shared on the company's social intranet.

Week 22 – Cooperation with another firm for usability

The catalyst's supervisor, together with a sales representative visited a client company to discuss their efforts in UX design and -evaluation. The two companies agreed to exchange best practices and function as guinea pigs for each other from time to time in the future.

Week 24 – Third externally sourced usability evaluation

The company management had expressed the value they saw in externally sourced usability evaluations and provided the design champion with a budget to do more evaluations; the third externally sourced usability evaluation focussed on the registration process in the company's web-platform.

Week 25 – Presentation on UX research

The catalyst's supervisor prepared a presentation about usability evaluations. He gave this presentation to multiple departments in the company to increase their awareness of his work and to underline the benefit it could have for the company. He showed some examples of previously conducted usability evaluations, which led many in the audience to see the added value.

Week 26 – External parties involved for persona and customer journey development

Together with CM's Chief Marketing Officer and his supervisor, the catalyst visited design studios. The goal of the visit was to discover if these studios would be beneficial to the company's efforts in further maturing its design capabilities. One of these studios specialised in user experience design, the other specialised in service design.

Week 26 – Usability evaluations with company clients

One of the sales representatives that joined the catalyst's supervisor at the client meeting in week 22 was very enthusiastic about doing usability evaluations and decided to host a session for usability evaluations with CM's clients before one of the matches of the local football team.

6.2.3 Quantitative results

Table 12 shows the mean answers given by employees across different departments in the second round of the survey, compared to the answers in the first round. The table lists the significant differences between the first and the second survey.

The analysis returned two significant differences between the two rounds of the survey. The first difference was the development department scoring for the application of design practices (importance) lower in the second round of the survey. The second difference is the employees in other departments that score the company's awareness of design's value (awareness) higher in the second round of the survey.

Figure 17 shows the overall means for the two rounds together in the Design Capacity Model. The dark blue represents the scorings in the first round, the orange represents the scoring in the second round.

Department	*Round*	*Awareness*	*Importance*	*User's involvement*	*Innovation drivers*	*Design capabilities*
Total	**First round**	**3.79**	**3.58**	**2.30**	**2.53**	**3.12**
	Second round	**3.90**	**3.24**	**2.14**	**2.48**	**3.13**
Marketing	First round	3.82	2.64	2.00	1.55	3.36
	Second round	3.88	2.63	1.75	1.88	3.63
Sales	First round	3.80	4.10	2.00	2.40	3.00
	Second round	4.00	3.50	1.80	2.50	3.20
Support	First round	4.13	4.13	2.75	2.75	3.25
	Second round	4.00	3.33	2.00	3.00	3.00
Development	First round	4.04	3.82[a]	2.36	2.77	3.14
	Second round	3.84	3.16[a]	2.16	2.66	3.00
Other	First round	3.30[b]	3.30	2.35	2.75	2.95
	Second round	3.91[b]	3.43	2.43	2.30	3.13

a,b: the difference is significant at the p<0,05 level.

Table 12: Compared results of the first and second survey

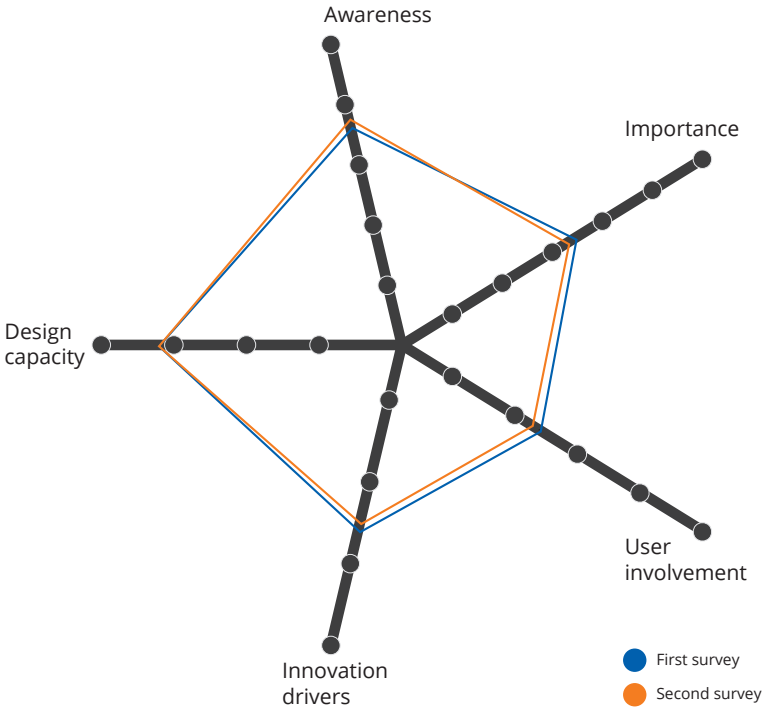


Figure 17: Plotted means from the first and second survey

A one-way ANOVA did not find any significant effects for the department variable on the scoring in individual scales in the second round. As the first round of the survey did find significant effects for the department variables on the scales rating the organizational awareness of design's value (awareness) and the drivers of innovation in CM (innovation drivers). The departments can thus be seen to be getting more aligned in their thinking about design in the company.

After comparing the differences in responses by each department in the first and second round of the survey, the results were compared for the three different levels of engagement with the catalyst. Table 13 lists these scorings. The scoring labelled before is the scoring provided in the first round of the survey. The results for each department were compared over the different levels of engagement using a one-way ANOVA.

This analysis did not find any significant effects for the level of engagement on the ratings of any scales. No effects were found on the total population (total) and on individual departments. Figure 18 displays the scorings given by the no/low engagements compared to the scorings given by the high engagement group.

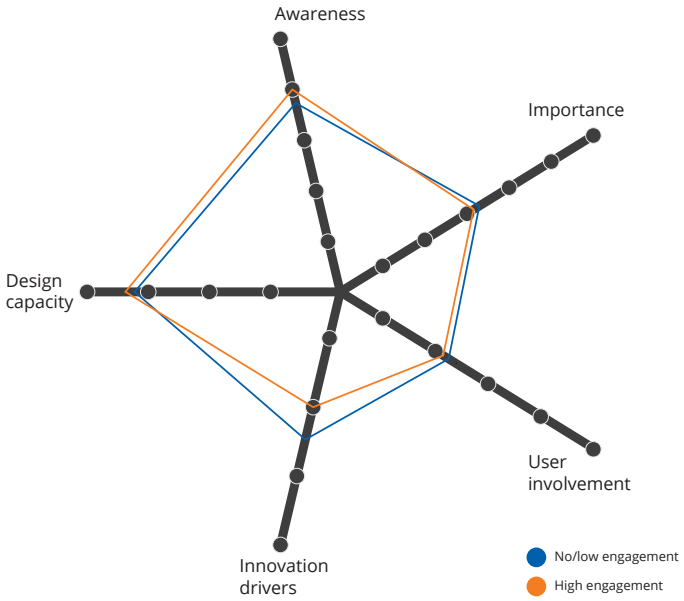


Figure 18: Plotted means for the two levels of engagement

Department	*Engagement level*	*Awareness*	*Importance*	*User Involvement*	*Innovation Drivers*	*Design Capabilities*
Total	**Before**	**3,79**	**3,58**	**2,30**	**2,53**	**3,12**
	No/Low	**3,89**	**3,26**	**2,14**	**2,54**	**3,10**
	High	**4,00**	**3,11**	**2,11**	**2,00**	**3,33**
Marketing	Before	3,82	2,64	2,00	1,55	3,36
	No/Low	3,75	2,75	2,00	2,25	3,75
	High	4,00	2,50	1,50	1,50	3,50
Sales*	Before	3,80	4,10	2,00	2,40	3,00
	No/Low	4,00	3,50	1,80	2,50	3,20
Support*	Before	4,13	4,13	2,75	2,75	3,25
	No/Low	4,00	3,33	2,00	3,00	3,00
Development	Before	4,04	3,82	2,36	2,77	3,14
	No/Low	3,82	3,18	2,07	2,71	2,96
	High	4,00	3,00	2,75	2,25	3,25
Other	Before	3,30	3,30	2,35	2,75	2,95
	No/Low	3,91	3,32	2,45	2,27	3,14
	High	4,00	6,00	2,00	3,00	3,00

**: Because no respondent was in the high engagement group, comparison was done using an independent samples t-test.*

Table 13: Survey results from the first survey (before) and second survey split by engagement level (no/low and high)

Together, the results indicated that the evaluation of design practices had not changed much over time. In part this was the result of the fact that the group that rated their involvement with the catalyst as high was only very small (9 out of 79). This made that changes, for example in the innovation drivers scale, had to be bigger to be significant.

The absence of differences between departments in the second round, indicated the evaluations for individual departments had become more aligned when compared to the first round of the survey, which did find differences.

6.2.4 Qualitative results

The interview transcriptions were subjected to a round of initial coding. In total, 301 notes were defined, distributed over 12 major themes. 8 of these themes were linked to the three interview topics. The remaining 4 themes could not easily be connected to any of the interview topics. They are therefore discussed separately. Table 14 briefly introduces these themes in relation to the interview topics, after which each of these will be discussed in depth. A full list of the themes and sub-themes is provided in Appendix I.

Interview	*Theme*	*Description*	*Notes*
Topic 1: User involvement in product development	User research	General remarks about user research	53
	User-centeredness	Remarks about the user-centeredness of the product development process	20
	Added benefit of external evaluations	People discuss their positive attitude towards external evaluations	22
	Self-referentiality	Remarks and attitudes about the self-referential approach for product development	18
	Quantitative data	Remarks on the value of quantitative data in the product development process	13
Topic 2: Awareness of design practices	Definitions of design	Participants discuss their views on what the design practice entails	42
Topic 3: Role of design in the organization	Responsibilities of the design professionals	Remarks on what the tasks and responsibilities for the organization's design professionals should be	39
	About design capacity	People discuss design capacity in the organization	8
Other topics	Organizational challenges	Remarks on what participants perceive as challenges in the organization with regard to design capabilities	28
	Organizational attitudes	Different remarks discussing attitudes in the company	15
	Visible change in the organization	People express changes that are occurring in the company	34
	Positive experiences with design workshops	Participants of design workshop discuss the positive experiences they have had	9

Table 14: Distribution of notes per topic

Topic 1: User involvement in product development

The first round of the interviews showed that interviewees had different attitudes about the value of user involvement in the product development process. The second round showed that all agreed users make a valuable contribution to the product development process. The interviewees did have different opinions on the way the user should be involved.

User research

All interviewees discussed their stance on user research. The participants generally agreed on user involvement in the product development process as a valuable and necessary addition to the product development process. Participants also agreed representative users ideally should be involved for the research, but all noted this may prove to be difficult and proposed to involve people who had been involved in CM's daily operations as little as possible.

However, the way to involve users was a point of discussion. Some expressed the importance of engaging with users in person, for example through one-on-one interviews, usability tests, or focus groups with industry representatives. Others favoured digital means, such as questionnaires or web-based usability testing tools.

> *"I would say you need to have one-on-one talks with customers to see what their needs are"*
>
> *Product manager*

> *"I think it would be very interesting to see how that process works, I believe there are web-tools to do that"*
>
> *Event coordinator*

Another point on which the participants expressed different views is the people responsible for the execution of the user involvement. Some noted this should be the responsibility for the sales department, as they were already heavily active in customer engagement, whereas others argued it should be the design professionals' responsibility, because they were the ones who translated knowledge from users into product flows.

> *"I think [design professionals] are the ultimate liaison between the customer and the company, discovering what the customer wants and translating that to product flows"*
>
> *Chief Technology Officer*

> *"sales also meets with a lot of customers day to day and they hear a lot of things from customers, so they can translate something to day-to-day work"*
>
> *Product manager*

The most interesting point raised in the interviews was the goal that user involvement should have. Naturally, involving users has a range of goals and different interviewees reflect this. The most prevalent goal of user engagement mentioned

by the interviewees was understanding how the usability of CM's products could be improved, but others also argued discovering features to add to (new) products would also be an interesting outcome.

> *"For example, discovering how the product is experienced so we can improve it"*
> *Junior developer*

> *"You get the information about technical performance, but you don't get anything about usability issues"*
> *Product manager*

> *"So you can discover what functionalities they miss"*
> *Head of software development*

In short, the interviewees all agreed that user involvement was a necessity if CM wanted to improve their products. The means to do so, as well as the outcomes of the involvement were still a point of discussion.

User-centredness

One topic found in the first round of interviews was CM's perception of what it means to develop products in a user-centred way. CM made products from a perspective where it designed for the user. The second round of interviews found the interviewees noted the organization should take a step further and design together with the user. As the previous section discussed, this would not mean letting the user decide, but rather understanding what does and doesn't work for the user. This acknowledgement was very much driven by a direct experience with a usability evaluation from a source outside of the company.

> *"You see that he doesn't understand a button and that it lacks logic, whereas it seemed perfectly logical from my point as the creator"*
> *Product manager*

> *"We are very much thinking 'we are user-centred because we think for the user', whilst being user-centred actually means that you're in contact with the user."*
> *Chief Marketing Officer*

This is very interesting because it shows that the catalyst's actions had helped the employees realize the employee himself isn't necessarily a representative user.

Added benefit of external evaluations

Although some hesitated to experiment with usability evaluations conducted by people from outside the company, those that had actively been doing these evaluations generally experienced it as an added benefit because it allowed them to save time for redesigns or because it helped them find new features to develop.

> *"For example, the multi-request processing request came from a customer, as well as the latency issue that we fixed"*
> *Product manager*

This acknowledgement contributed to the finding discussed before that the catalyst had supported the realisation that external sources for evaluation were a valuable addition.

Self-referentiality

Another topic raised in the first round of interviewing was the extent to which CM relied on its own ability and expertise to discover potential improvements for their products and services. As with user-centredness, the second round of interviews showed interviewees became aware this happens in CM and acknowledged insights from external sources could provide a valuable addition to the potential improvements discovered based on internally available expertise.

> *"When you have been working on something for a few months, of course you say 'This is the new interface, this is going to be better', but who says it's an improvement?"*
>
> *Product marketer*

This also contributed to the notion the catalyst had created a shift in perception of CM's existing practices.

Quantitative data

The first round of interviews uncovered that a strong preference for quantitative data existed in CM. An often-noted motivation was that quantitative data from sources such as google analytics provided an unbiased image of the way people use CM's products. In the second round of interviews, it was found quantitative data was still perceived as an important base for evaluation, because of its scalability and easy interpretation. However, reactions to the other topics showed qualitative data increasingly perceived as valuable.

> *"I think quantitative data should be the basis, because the more data you have the more you can see trends upon which you can act"*
>
> *Chief Marketing Officer*

> *"For example, we don't measure the NPS, the net promotor score, and with that you can find out what you can improve upon."*
>
> *Financial analyst*

Together, it can be seen that the value attached to the findings from user research have increased. Mostly, this was the result of an increased valuation of qualitative data, without replacing the value attached to quantitative data.
The findings regarding the entire topic can be concluded to be that a shift had occurred in the way interviewees perceived engagements with users. The first round of interviews showed that people didn't always see added value in the involvement of externals, either because it would lead to tailor-making of products or because CM could think of enough ideas for product improvements themselves. The second round showed that after people engaged with the catalyst, user involvement was seen as a valuable addition to product development processes.

Topic 2: Awareness of design practices

The topic of awareness of design practices focused mainly on developing an understanding of what design meant to the interviewees. As all were involved in the catalyst's work to some extent, it could be assumed the interviewees were aware of the value of design to some degree. Understanding what design means to those involved was interesting, because it helped build an understanding of what it was to them that made design create value.

Furthermore, understanding who in CM was aware of the added benefit design can bring was done through observations, because it helped to make a cross-section of the organization.

The second round of interviews found definitions for design in three categories; design as a tool for aesthetics, design as a tool for usability, and design as a process for product improvement. One notable finding was none of the interviewees defined design solely as a tool for aesthetics; many discussed that product styling tools were only a few of the many tools in the designer's toolbox.

This arguably also led to people discussing that aesthetics should not be the top priority for CM. Many argued the first step would rather be usability.

> *"For our firm, the focus should initially be placed on usability, not on beauty"*
> *Product Manager*

> *Design to me is about having a structured approach to solving problems. So you first make a diagnosis of the problem, then look at different solutions, of which you choose the best. After the implementation you make an evaluation*
> *Financial analyst*

> *"To me, design doesn't mean 'we made it look nice, we fixed the colours and now we're done'".*
> *Chief Technology Officer*

This signals the company was changing in its attitude towards design, as it showed for those involved in the catalyst's work, design was no longer seen as merely a downstream styling tool. Although all saw styling as one part of the application of design, to many it had become a tool that would improve product usability through a structured process of defining and addressing challenges in products.

Topic 3: Role of design in the organization

During the second round of interviews, the role of design was discussed in two themes. The first discussed the role the design professionals should have in the organization according to the interviewees. The second theme discussed remarks made by the interviewees regarding the organization's design capacity. The first theme was explicitly discussed by the catalyst during the interviews, whilst the second arose during conversations.

Responsibilities of the design professionals

The previous section discussed that none of the interviewees viewed design as only a styling tool. The responses provided when asked about what they saw as the tasks and responsibilities for the design professionals in the organization reflected this. Many agreed the designers' responsibilities included gathering knowledge about use and usability, and to translate these into highly usable products that also looked good.

> *"Within the scope of a team, they should be committed to making the best possible user experience"*
>
> *Product manager*

> *"That also means interviewing users, whether they are internal or external"*
>
> *Product marketer*

Furthermore, some argued the design professionals should work closely together with each other to safeguard the company's visual identity. This meant they would be responsible for developing coherent product aesthetics as well as the responsibility for all other branded materials to be in line with the brand identity.

> *"Uniformity in the platform, the UX designers should collaborate so that there is a uniform presentation, both in our products and our website"*
>
> *Senior front-end developer*

A consensus that not every design professional should have the exact same competencies was also discovered. People acknowledged the broad definition of the responsibilities meant different individuals could be responsible for certain aspects of that general task.

> *"They are both designers, but one is better at making a very beautiful product, whilst the other is better at analysing and interpreting data"*
>
> *Product marketer*

Together, the participants expressed different views of what a designer would be responsible for. However, responsibilities that were expressed by nearly all participants were product usability and aesthetics.

Design capacity

All interviewees who discussed design capacity in the interview noted they perceived CM's design capacity as too low. This resulted in challenges for product development. Although the interviewees acknowledged CM had hired 3 additional designers, only one of these had started during the interviews.

> *"He says 'I do my best and produce designs, but I'm only here for two days per week'"*
>
> *Senior front-end developer*

In short, the participants acknowledged and welcomed CM's effort to increase its design capacity.

Other topics

During the interviews, other themes that could not be related directly to one of the three interview topics drafted beforehand were discussed as well. These topics discussed the organization's attitudes and challenges as well as the changes that occurred as a result of the design catalyst's presence and actions.

Organizational challenges

For one part, the organization faced challenges because the company was growing rapidly and making a transition from a small company to a large one. This created a lot of challenges in maintaining the company culture of as-little-as-possible hierarchy and of freedom for individuals to explore potentially valuable innovations.

Other challenges noted by interviewees regarded the development of design capabilities. Interviewees regularly discussed the 'scariness' of going outside of CM to receive feedback on the products CM offers.

> *"I think that maintaining our culture is one of the biggest challenges, but I think we're working on this very actively"*
>
> *Chief Technology Officer*

> *"I can imagine that it is quite scary, because you have made a product from your extensive technological expertise, and now you have to adjust your work based on a layman's opinion"*
>
> *Event coordinator*

The company thus acknowledged the challenges that came with the transition it was in. The interviewees also noted the company was making substantial efforts to address these challenges.

Organizational attitudes

The organizational attitudes expressed by the interviewees were largely in line with those expressed in the first round of interviews. An interesting thing to see was that interviewees also started to acknowledge that working on products may leave an employee with a tunnel vision about that particular product.

> *"Once you start working on something every day, you kinda get stuck in the bubble and you think that everybody understands it perfectly well as you do"*
>
> *Product manager*

In short, the organizational attitudes about topics such as individual freedom had not changed. The attitudes about product development were slightly shifting in favour of external involvements.

Visible changes in the organization

Changes in the organization were not only observed by the catalyst, they were also expressed by the different interviewees. The changes expressed referred to the value of external sources of information, the company's hiring policy, and the changing managerial attitudes towards the design practice.

> *"More than before I hear people say 'well, that's a nice idea, but does the customer want it?'"*
>
> *Product marketer*

Although the observations already indicated these changes, it is interesting to see that CM's employees were aware of them as well.

Positive attitudes towards design workshops

Some of the interviewees had also been involved in design workshops organized by the catalyst and expressed their positive attitudes about them in the interviews.

> *"I really appreciate the workshop that we had with [PRODUCT], I think it was very useful, and we're definitely lacking those kinds of sessions in the company"*
>
> *Product manager*

> *"It really helped me realize how much of a tunnel vision we develop whilst working on a product"*
>
> *Product manager*

This acknowledgement underlined that the catalyst's efforts had been effective in creating awareness of the added value of design capabilities. Furthermore, the comments also showed that to those involved, the workshops felt as interesting and valuable, rather than something they only took part in to please the catalyst.

6.3 Summary

The results showed two things: First, on a macro level, no change was visible. Second, on a level of individuals in the organization, changes were observed. Chapter 7 explores these changes more in depth.

The macro level was explored through comparing results from the first and the second time the survey was distributed. These results are made visible in figure 17 (page 89). Also between the group with no or low engagement and the group that had a high engagement with the catalyst, no results could be seen (figure 18, page 90).

Whilst the survey did not show any changes in attitude between people from different departments in the company, observations and interviews suggested that individuals have changed their attitudes and behaviour.

Examples of changing attitudes amongst individuals included the product manager who notes that he asks every new employee in CM to take part in a usability test for one of his products.

Especially interesting was seeing this same product manager acknowledge that this was not the 'perfect' way, because he sees the participants were still company employees and may therefore have some experience or knowledge about the product.

Another interesting example of a change in attitude was the company's CEO. During the first engagement with the catalyst he noted he did not yet believe engaging with externals in order to inspire product improvements was necessary, because he felt that the company could find many improvements from internal evaluations. However, after being sent movie clips from an externally sourced usability evaluation, he noted that using external sources to evaluate product usability makes a valuable addition to the internally existing knowledge.

7. Reflection on the changes in CM

This chapter further explores what changes occurred in the organization. As there were no macro-level effects discovered in the survey, the reflection focusses on the effects on individuals. It does so by first describing the changes that occurred in the behaviour of individuals after which it describes the changes in attitudes.

7.1 Changes in behaviour of individuals

The changes in behaviour focused on how the actions of individuals have changed. As the theory of self-perception discusses, one's behaviour is not necessarily driven by one's attitude, but it also occurs that behaviour drives one's attitudes (Bem, 1972). As the catalyst engaged in a lot of activities with individuals, behaviours changed as well. Notable changes in behaviours are discussed below.

Engagements in workshops helped adoption of design practices

The common saying "seeing is believing" was very applicable to the individuals in the organization. Many individuals were somewhat sceptical about the added value of doing a usability evaluation with people from outside of the company at first, because the organization argued that it was able to discover a lot of potential improvements for the products from an internal evaluation.

However, once they had been involved in doing a usability evaluation or being confronted with a movie clip from an externally sourced usability evaluation, many individuals noted that this had to become a common practice in the organization.

Individuals start taking initiatives for design activities

Individuals that engaged in workshops led by the catalyst took up initiatives for design activities. The product manager who has made it mandatory for all new employees to take part in a usability evaluation has been noted a number of times. But other initiatives have also been taken.

At some point, a participant of a workshop on building a registration process for an application wanted to develop a product page on which users could find plugins and support documents. In order to do this, he asked the catalyst's supervisor to prepare a one-day workshop to make a high-fidelity prototype for this. He organized much of the workshop himself, but found that he needed the design champion's help in leading the workshop. This showed that there is a learning curve amongst those that have been engaged with the design catalyst.

These initiatives are crucial to the success of the catalyst's work, as the catalyst's time in the company was limited and could therefore not support the change over a prolonged period of time as other design innovation catalysts have been able to. In a conversation that occurred after the interviews, the product manager that does mandatory usability evaluations with new employees noted that he is encouraging other product managers to do the same thing and helping them set up similar tests.

In order to facilitate these individuals in their efforts, the catalyst developed small booklets that helps them conduct a design workshop themselves. These booklets helped project teams carry out two types of workshops, based on what were found to be the workshops that worked best during the catalyst's presence at CM. The booklets were developed to facilitate two types of workshops; one to conduct small-scale usability studies, either bought in externally or carried out by the teams themselves, and one to fill out a value proposition canvas. These booklets are shown in figure 19. Larger versions of the booklets are available in appendix J.

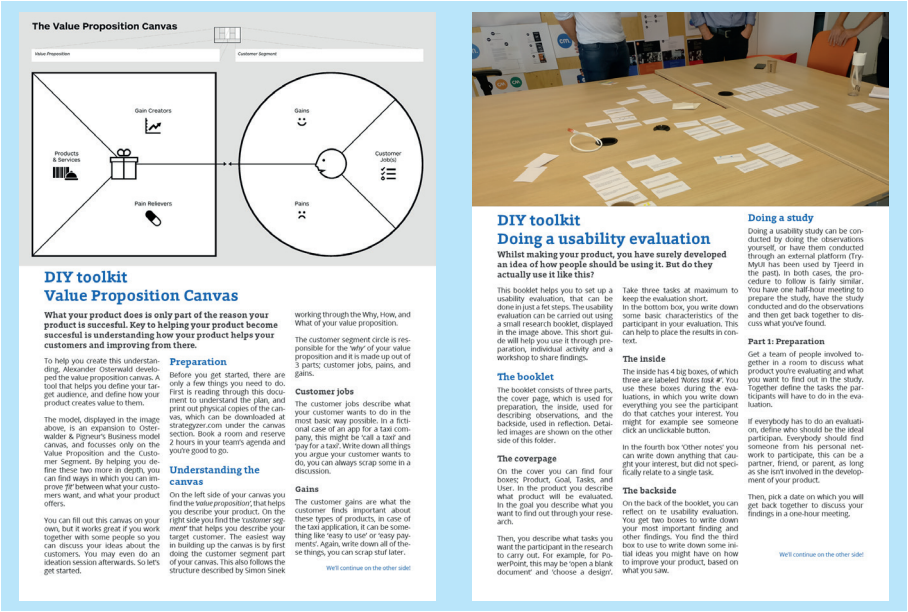


Figure 19: Workshop booklets

7.2 Changes in attitudes

Next to the observed changes in behaviour that were discussed in the previous section, the results also showed attitudes towards design practices had changed. This section describes the most important changes that were discovered by the catalyst.

Attitudes towards design practices

The most apparent change in attitude is the change in the perceived role of design. In the first round of interviews, the catalyst found that to many in the company design was merely a tool that served to translate technology-driven innovations into aesthetically pleasing products. In the second round of interviewing the catalyst found that none of the interviewees, which all had been engaged with the catalyst's work to some extent, listed design as a tool for styling.

Although all agreed that styling is an important aspect of product development, many noted that design is about the integration of knowledge to develop products that create value to users. Others even noted that they saw design as a process that organizations should use as a structure to address questions of innovation and product development.

Additionally, many noted that to them, design professionals shouldn't be confined to the practice of making products look good. They argued design professionals should engage in understanding customers and users, translating these insights into highly usable and good-looking product interfaces. They should follow these innovations up through evaluations. When reflected to stepping stones in the Design Ladder (Doherty et al., 2014; figure 20), one could argue the individuals that were engaged with the design catalyst's work have all at least taken the first stepping stone, with some arguably having moved beyond the third level and towards the fourth level in the Danish Design Ladder. A more detailed description of the stepping stones that lie between the third and fourth step in the Danish Design Ladder can be found in appendix K.

Attitudes towards user involvement

In the exploration of the initial state of design capabilities, the catalyst found that there were a range of attitudes concerning user research and -involvement. During the interviews conducted in the second round, the interviewees still had some differences in their ideas on user research and involvement of people from outside the company in the product development process. However, an important consensus was discovered: although the means of doing user research proposed were different, all interviewees agreed that doing user research and involving outsiders was important.

This is arguably a very important part of taking steps towards developing design capabilities. As outlined in section 4.5, the catalyst proposed that the organization should open up to engaging with people from outside of the company in order to inspire the NPD process. Those involved in the catalyst's work agreed on the importance of doing so. This provides an example that once people get involved in these practices they can overcome their initial fears. These fears were that outside involvement in the product development process results in unfunded critique of their work and that it would lead to tailor-making of products.

Attitudes towards design activities

In general, more employees in CM were seen to be opening up to the potential added value of design capabilities. Not only were they seen to be more enthusiastic about external evaluations in the product development process, but also about the creation of in-context understandings of the company's products, as the reactions to the workshop on the value proposition canvas show.

The interview data and observations show that people were initially hesitant or sceptical to participate in workshops or otherwise engage in activities that were perceived as being beyond their daily activities. Data suggested this has been replaced by a curiosity to engage in these activities, noting that trying was always an option.

Attitudes towards quantitative data

Another theme that regularly occurred was the attitude towards various forms of data. During the catalyst's exploration of the company he found that a strong preference for quantitative data existed, because many felt that quantitative data was highly reliable. They considered qualitative data subject to interpretation by the individual and therefore less reliable.

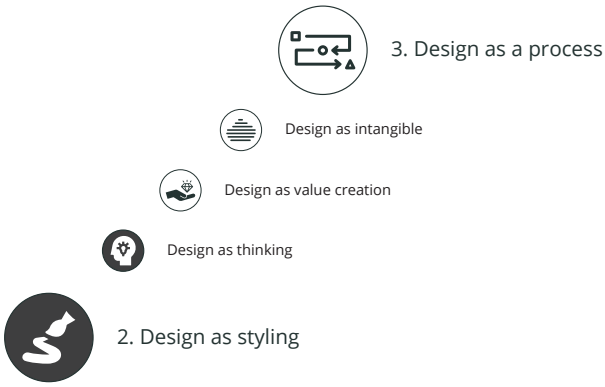


Figure 20: Position on the cultural stepping stones of the employees involved in the catalysts effort

During the second round of interviews, the catalyst found that many interviewees had an increasingly positive attitude towards the use of qualitative data in order to enrich the quantitative performance metrics employed by the company. It must be noted that the increased value attached to qualitative data as a source of inspiration for product improvements was not at the expense of the value attached to quantitative data. This is shown by employees who note that quantitative data should be at the base of evaluations.

Attitudes towards CM's design capabilities

Although the results did not find any differences between the two groups with no to low engagement and the group with high engagement, the interview data did suggest that the way those involved in the catalyst's work perceived CM's design capabilities had started to shift.

As a result of their expanded understanding of design capabilities, those that had a high engagement with the catalyst's work became more critical of the company's performance. These critiques mostly regarded two of the barriers described in section 4.4; CM's self-referential approach to product development and the low user involvement in the NPD process. CM's CMO describes this by noting "We are very much thinking 'we are user-centred because we think for the user', whilst being user-centred actually means that you're in contact with the user".

As these signals were not reflected in the survey outcomes, the realization may have occurred only amongst a small number of individuals. Still, such a realization created an excellent opportunity for the catalyst to further build design capabilities in the company. Initially, CM's employees had a low urgency to change their way of working because they didn't see anything wrong with their way of working. Only once a realization occurred that there was room for improvement of practices could somebody support these people in making the transition. This also explains why the catalyst initially encountered some resistance in the firm against his efforts, but as more time passed people became more interested in the catalyst's work and how this could benefit their projects.

Shifting of defined attitudes

Section 4.4 described three attitudes towards user involvement and design activities in general; the tech-driven innovator, the feedback-driven innovator, and the user-driven innovator. As a result of the catalyst's work it can be argued that throughout the company, the share of the tech-driven innovator is decreasing because more people are becoming aware of the added benefit the development of design capabilities could have to the organization. Furthermore, the share of the user-driven innovator is arguably growing, because more people are seeing the potential of design capabilities.

Because the catalyst didn't engage with all employees, accommodating significant change across the entire organization was difficult; this is also reflected in the scorings in the second survey. However, because of the CEO's endorsement, it can be expected that this change will eventually be seen across the entire organization.

7.3 Summary

This section has discussed the effects of the catalyst's efforts to build design capabilities in CM. Certainly, the changes have not occurred over the entire organization, this is also reflected in the fact that the survey did not find effects on a macro-level. However, this could not be expected as the research lasted for only 26 weeks. Like other large-scale concepts such as agile or total quality management, the integration can take years (Jenkins, 2008). The changes in the organization are discussed by first looking at the changes in behaviour and afterwards describing changes in attitudes.

The changes in behaviours and attitudes concentrated the following subjects:

- **Design practices:** Amongst those that had been involved in the catalyst's efforts, a shift in their perception of design practices became visible. None of those involved described design as only a tool for styling. Although all agreed styling was an important aspect, all saw other applications as well.
- **User involvement:** All interviewees discussed the involvement of users in the product development process as a valuable addition to the knowledge and expertise available in CM. This was a stark contrast to the first round of interviews that found that employees didn't always see involvement of users as valuable.
- **Qualitative data:** Whereas the first round of interviews found that qualitative data was considered less valuable because it was subject to biases and didn't provide a solid base for decisions, the second round of interviews found that those involved in the catalyst's work had come to see it as a valuable addition to the quantitative performance metrics applied by CM.

Furthermore, the catalyst observed efforts by the company to improve its design capacity by hiring additional design professionals. Another signal that CM's management had realized the added benefit of well-developed design capabilities was the fact that the management had declared 2018 to be 'The year of design'. This meant the company would be further investing in its design capacity and capabilities.

8. Conclusions & recommendations

This chapter presents the main research conclusions. Subsequently it provides recommendations for CM, future DICs, and future research.

8.1 Main conclusions

This section first answers the two sub-research questions before it answers the main research question.

> *SRQ[1]: What barriers to the development of design capabilities exist in the investigated firm?*

The first barrier discovered was CM's strong inward focus for product development. CM was found to be very self-referential in its product development process, relying strongly on their own knowledge and expertise to discover opportunities for product improvements. As a result, CM did not structurally engage in a conversation with customers and users. This made that there was no stream of information about product innovation opportunities towards the product development. Development teams were therefore solving problems that they saw as problems, but which might not be as important to customers. Eventually this may lead to a product portfolio that is out of tune with customer needs and wishes, making it less attractive to them.

To overcome this barrier, the catalyst argued CM would have to engage more with customers and user to inspire the product development. Doing this required two important things to happen: 1) Product development teams would have to be made aware that doing user research is not as difficult and complex as it seems. 2) An infrastructure should be developed that allows insights from markets, customers, and users to be available to the entire organization and especially to product development teams.

The second barrier discovered in CM was an unawareness of the breadth of design capabilities, the diversity of tools in the design toolkit, and the potential benefit it could have for the organization. Many employees saw design as a downstream styling tool that was mostly concerned with translating technical innovations to visually pleasing interfaces. As a result of this, CM did not directly see a potential added benefit in investing in design capabilities, and were thus hesitant to change their existing practices. This hesitation was further [strengthened] by the growth CM was experiencing, which made it that people felt only little urgency to develop design capabilities in the organization. Ultimately however, design practices could support CM in maintaining a steady stream of innovation, which helps to facilitate future growth.

In order to achieve this the catalyst decided to engage with employees to support their understanding through conversations. He furthermore provided employees with reading material to inspire them.

The third and final barrier was CM's low design capacity. As a result, design professionals were unable to cover the styling of all of CM's products in depth. This made it that developers were forced to cover many details by themselves, which would ultimately lead to dissonance in product styling, which would be detrimental to the company's professional image. Therefore, a note to the board was prepared which outlined why CM needed additional design professionals, and what roles these designers would play in the organization.

After a period in which the catalyst engaged with CM's employees to overcome the described barriers, the catalyst evaluated his impact on the firm in order to answer the second sub-research question.

> *SRQ[2]: How have the perceptions of design practices shifted as a result of the interactions with the design catalyst?*

The evaluation led the catalyst to conclude that his efforts at CM had a substantial effect. Although the survey did not find any effects on a macro-level, the interview data suggested that on the levels of individuals changes in behaviours and attitudes had occurred.

The first change that was visible was the perception of design practices. Whereas the exploration showed that CM's employees were not fully aware of the breadth of application of design and perceiving design as a downstream styling tool, the second round of interview data showed that none of the interviewees regarded design as only a tool for styling. Many interviewees described design as a process to improve product usability by iteration. Others even described design as a structured process to discover challenges and opportunities and address these. A number of employees had come to value usability evaluations or other design tools so much that they decided to make them a part of their product development process.
Furthermore, the catalyst discovered that attitudes and behaviours towards user involvement had also shifted. Whereas initially employees were found to be hesitant to involve users, the interview data showed that all interviewees saw user involvement as a valuable addition to knowledge and expertise available in CM to improve products. Along with this came an increased appreciation for qualitative research data. The first round of interviews found that many employees saw qualitative data as less reliable because it was subject to investigator bias. The second round of interviews discovered that those involved with the catalyst's work saw qualitative data as valuable because it was able to bring more depth to the quantitative performance metrics applied by CM.

Thirdly, over the course of the catalyst's presence at CM, additional design professionals were hired by CM. Thereby the company met the boundary conditions outlined in section 4.5. When reflecting this development on the Danish Design Ladder, one can argue that the company had established a solid base at the second tier in the Ladder.

The catalyst's actions also inspired individuals to change both their behaviour and attitudes towards the third level of the Danish Design Ladder. However, because the catalyst's presence in the company was too short to engage with all employees, not everyone has made this step. It must therefore be concluded the company had not fully achieved the third level of the Danish Design Ladder (figure 20, page 105). If the company maintains their efforts it will certainly reach this level in the foreseeable future. The following section describes more in depth what CM should do to maintain these.

These changes made the catalyst conclude that is effect on the organization had been substantial, and that there were a number of reasons why the effect created was so large. The reasons support the answering of the main research question:

> *RQ: How can a design innovation catalyst support the development of design capabilities in a software SME?*

The catalyst identified three essential methods that, together, have successfully contributed to his ability to cause the substantial shifts in attitude and behaviour in the organization.

- **Charting the organization's strengths and weaknesses:** This understanding helped the catalyst to use the organization's strengths to overcome barriers to the development of design capabilities.
- **Combining a top-down and bottom-up approach:** Engagements with CM's management helped the catalyst to create a company-wide awareness. Providing product development teams with tools to engage in design activities allowed for design capabilities to be built. This way, the management's endorsement stuck to people, because they knew what the management was talking about and had the tools and felt supported to put it into action.
- **Combining group and personal engagements:** Because the catalyst engaged with individuals to explain his work and inspire them, individuals became more enthusiastic about the design workshops. Because individuals had an intrinsic motivation to participate, rather than feel forced by the catalyst, the design workshops became more successful. The high effectiveness of the design workshops led to a better understanding of the potential benefit of design capabilities to CM, thereby making adoption of design capabilities easier.

Together, these practices can be said to have benefitted the catalyst's impact on the organization. The following section continues by describing how CM can maintain the momentum created by the catalyst. It furthermore describes what future DICs should take into account when building design capabilities in an organization.

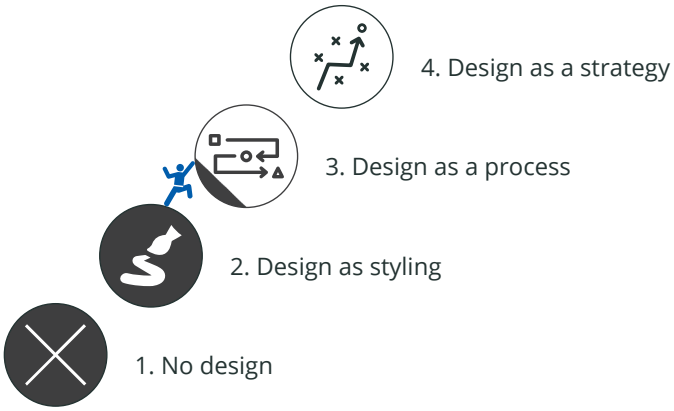


Figure 21 CM's position on the Danish Design Ladder

8.2 Recommendations

This section first provides recommendations for CM to maintain the momentum, after which it describes what other companies and DICs can learn from this study.

8.2.1 Recommendations for CM

At the end of the research, the company was working to reach the third tier in the Danish Design Ladder. In order to continue the momentum created by the catalyst the company needed both people and tools to reach this.

Maintain a role of facilitator

Foremost, the company would benefit from one or more individuals taking the role of facilitator in the company to support project teams in getting used to working with design tools. Ideally, these project teams would eventually be able to use these tools without help.

Throughout the catalyst's presence in the company, the catalyst's supervisor used the momentum created by the catalyst to expand his role as a designer in the company in order to perform this task of facilitating his colleagues. This can be seen through the numerous milestones (described in section 6.2) in which he was involved. Additionally, those having positive experiences with design activities must also be encouraged to share these with their colleagues.

Another interesting option for CM is to consider involving more outsiders into this process, as external organizations bring in a fresh perspective and expertise from similar projects done for other companies. If CM wants to do this using outside knowledge, it is advisable to consider a professional services firm instead of a new graduate student. Although this may be more expensive, the organizations often have more people available, which is necessary to support the large number of people in CM.

Encourage product teams to take initiatives for design workshops

The company needed to be provided with tools to continue working with the design activities that were initiated by the design catalyst, as some individuals already did. The design catalyst developed small booklets to help teams carry out workshops by themselves. The booklets are shown in section 7.2, and larger in Appendix J.

Further facilitation of knowledge sharing between

CM needed encouragement to share industry-based knowledge between different departments. This is part of the second proposition described in section 4.5. This was covered less extensively, because the workshops led by the Design Innovation Catalyst focussed mainly on the first proposition (engagement with users to inspire the NPD process).

8.2.2 Recommendations for companies looking to build design capabilities by employing a DIC.

An important reason the catalyst's impact in CM has been so substantial is because CM provided a lot of freedom to its employees to experiment in their

way of working to make better products. Therefore, the initial hesitation to experiment with design tools, gradually turned into a curiosity to engage in these activities. A company that is looking to engage in a similar research can learn a number of things from this success. These are described below.

First, the company's management should provide for an endorsement to experiment with product development tools and methods. As Pozzey (2012) also found, managerial endorsement for experimentation with design practices and product development methods is crucial to the chances of success. This provides employees with the confidence that the management is supporting them and they are contributing to the organization's future success.

Apart from managerial support for experimentation, it is important that the company has room for experimentation. If the organization does not have this room for experimentation embedded in its culture like CM has, a company can create an incubator-like environment to experiment. This approach can be seen in KLM's X-Gates and X-flights approach (TU Delft, 2017). This environment should exist in parallel to the organization's daily activities, which makes it more attractive to more conservative companies or those that operate in highly regulated markets.
This approach may also be interesting for large organizations. Already in CM it was visible that the reach of the catalyst may not have been enough to create a critical mass. In organizations larger than CM it may be interesting to select a number of product teams and dedicate a DIC to support them.

Another option for organizations would be to employ multiple DICs at the same time, because they can work together and learn from each other. This upscaling benefits the effect in the organization because 1) multiple DICs can engage with more people in the organization, and 2) learning can happen much quicker because multiplying the number of interactions also multiplies the number of learnings.

8.2.3 Recommendations to future Design Innovation Catalysts

Apart from the best practices presented in the previous section, future scholars looking to build design capabilities in any small-scale organization can draw upon a number of recommendations for their work based on the catalyst's experience. The first recommendations regard the research set-up, followed by recommendations about activities.

Make an open exploration of the company

Approaching the company form an open mindset requires the first research question to explore both the strengths of the organization and the barriers to developing design capabilities. The first research question applied in this research focused solely on the barriers, and thereby the catalyst developed a somewhat one-sided perspective regarding CM.

Besides unnecessary frustrations to the catalyst, this also delayed the project because the one-sided point of view made it difficult to develop strong propositions for first steps to take in developing design capabilities.

Use an alternative survey for the Design Capacity Model

The catalyst also found that the survey carried out using the design capacity model (Storvang et al., 2014) was of limited benefit to the catalyst's analysis. A quantitative analysis of the organization on a macro level can be very beneficial because it provides a background for interview findings. A quantitative macro-level analysis also often helps to communicate with managers. Managers may be less interested small-sample qualitative data because they may perceive it as a false generalization (projecting the findings from a small sample onto the entire organization) or because they find qualitative data less trustworthy (investigator bias). However, a survey based on the Design Capacity Model may be less effective in an organization that has a limited understanding of the design practice, because it required a well-developed understanding.

Focus on groups instead of the entire organization

A catalyst's impact on an organization that is of similar size to CM is limited because of two reasons; first, the organization employs a large amount of people and personally engaging with everyone in a meaningful way is impossible for a single person. Second, engaging with the DIC is not a priority for any of the company's employees. Therefore, employees do not always have time for engagements.

It is thus advisable to find a few project teams that are willing to work together with a catalyst and try to engage with them very intensively; this supports the uptake of design capabilities in these project teams. Building design capabilities in an organization works better if it is done well with a smaller group of people than doing it to a very limited extend for a large group of people. This research engaged with around 20 people excluding managerial stakeholders, which was found to be a manageable size.

Maintain regular and positive contact with the company's management.

Engagement with management is important for two reasons. First, an endorsement for the catalyst's work was found to improve the chances of successful development of design capabilities. This research found the CEO's public endorsement created company-wide awareness of the catalyst's work, making it easier for the catalyst to engage with other employees.
Second, managers are likely to be interested in the outcomes of the catalyst's work, as it is likely managers have agreed on employing design catalysts to explore the potential added benefits in the first place. Therefore, they can be expected to be interested in her or his work.

Engage with employees outside the research scope.
Working as a design innovation catalyst often requires more personal engagements than it requires performing design activities. Therefore, the work as a design innovation catalyst strongly benefits from personal relations with CM's employees. It is thus advisable to invest in these both during and outside of office hours.

8.3 Limitations

The most important limitation of this study is the short period in which the catalyst was embedded in the company. Whereas previous DICs had been embedded in organizations for periods ranging between 12 and 24 months, this study lasted for only 6 months. This has had an effect on the sustainability of the catalyst's impact in a number of ways.

- **Habit formation:** Building complex habits like the application of design practices in individuals requires a multitude of occurrences over a prolonged period of time (Lally, Van Jaarsveld, Potts, & Wardle, 2010). The short period has made it that the catalyst's efforts have not translated into long-lasting habits.
- **Critical mass:** Because the catalyst engaged with a relatively small number of people in CM, the effects may fail to cause a snowball effect that influences all employees after the catalyst's tenure.
- **Infrastructure:** Building the infrastructure for design in an organization, for example to systematically collect and gather user insights, requires time to set-up and refinement cycles. The short period of the catalyst's presence at CM made it that there was no time to make these refinement cycles. CM was thus left with working tools, but these were not optimized for application in the specific organization.

This however, does not mean the results should be discarded. The catalyst has built substantial momentum in the organization to build habits, create a critical mass, and refine the infrastructure. It is however important for CM to follow-up on these efforts. Either through an internal facilitator, or a professional services firm.

From a methodological perspective, an important limitation is the small overlap between the group of employees involved in the first round of interviews and the group involved in the second round of interviews. This occurred because in the first round of interviews, the catalyst explored the company, talking to a wide variety of people, whereas the second round of interviews specifically targeted those involved in the catalyst's efforts to build design capabilities. As a result, the interviews may not accurately reflect the change that happened during the catalyst's presence in the company as the interviewee's attitudes had not been investigated at the start of the project.

8.4 Future research

At the end of the research, the catalyst found a number questions he asked with regard to the outcomes. These questions formed the basis of directions which future studies can explore.

Longer period of embedding.

Although the catalyst's efforts caused considerable changes in the behaviour and attitudes of the employees involved in the catalyst's work, the catalyst engaged with only a small number of the company's employees in the Netherlands. A longer study could engage with more company employees and would allow the catalyst to experiment with a variety of design tools. At the end of the research the catalyst felt as if there was much more to be achieved in the company than the already impressive change that happened during the catalyst's presence.

Long-term effect of a DIC

Scholars could furthermore investigate the effect of a design catalyst's presence after the catalyst left the company. Existing work focusses on the effects at the end of the research period, but it would be interesting to investigate what happened in the one or two years after the design catalyst has left and the company was left to their own devices.

Develop an overview of barriers

This research found a set of boundaries in the organization, but existing knowledge did not provide any means of reflection. Therefore, the catalyst could not know if the barriers he had found were unique to CM or if they existed in other organizations as well. Scholars could build an overview of barriers to adopting design capabilities that reoccur across or within industries and connect it to knowledge available on overcoming these barriers.

Develop a more applicable survey

The Design Capacity Model (DCM) that was used in this research was found to be difficult to understand for a large number of employees. The most important reason for this was that it assumed that individuals had a very complete understanding of design. In organizations that call in the help of a DIC, this is usually not the case, as the fact that the catalyst was often asked "what do you mean with design" whilst distributing the survey shows. A suggestion would be to develop a survey that uses multiple (likert) scales for each of the DCM's scales.

Investigate organizational infrastructure

Future studies could also address the questions proposed in section 8.3, investigating the time it takes for individuals in the organizations to adopt design activities as habits in the product development process and building an understanding of what it requires to build momentum for organizational change. This would lead to an understanding of what infrastructure is necessary in companies to facilitate the building of design capabilities and what could be considered 'critical mass' to make the effects of a catalyst's presence lasting.

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Abstract

The study investigated a small- to medium-sized enterprise (SME) that had expressed the interest to explore the potential benefits of developing design capabilities. Previously, CM had conducted a company-wide branding exercise and saw an opportunity to explore this further. During a 6-month period, the researcher was embedded at CM as a design innovation catalyst to understand what first steps the company could take and to help the firm take these steps. Through design workshops and knowledge sharing, the catalyst managed to improve the understanding of design and have employees that were more actively involved in the catalyst's work change their behaviours.