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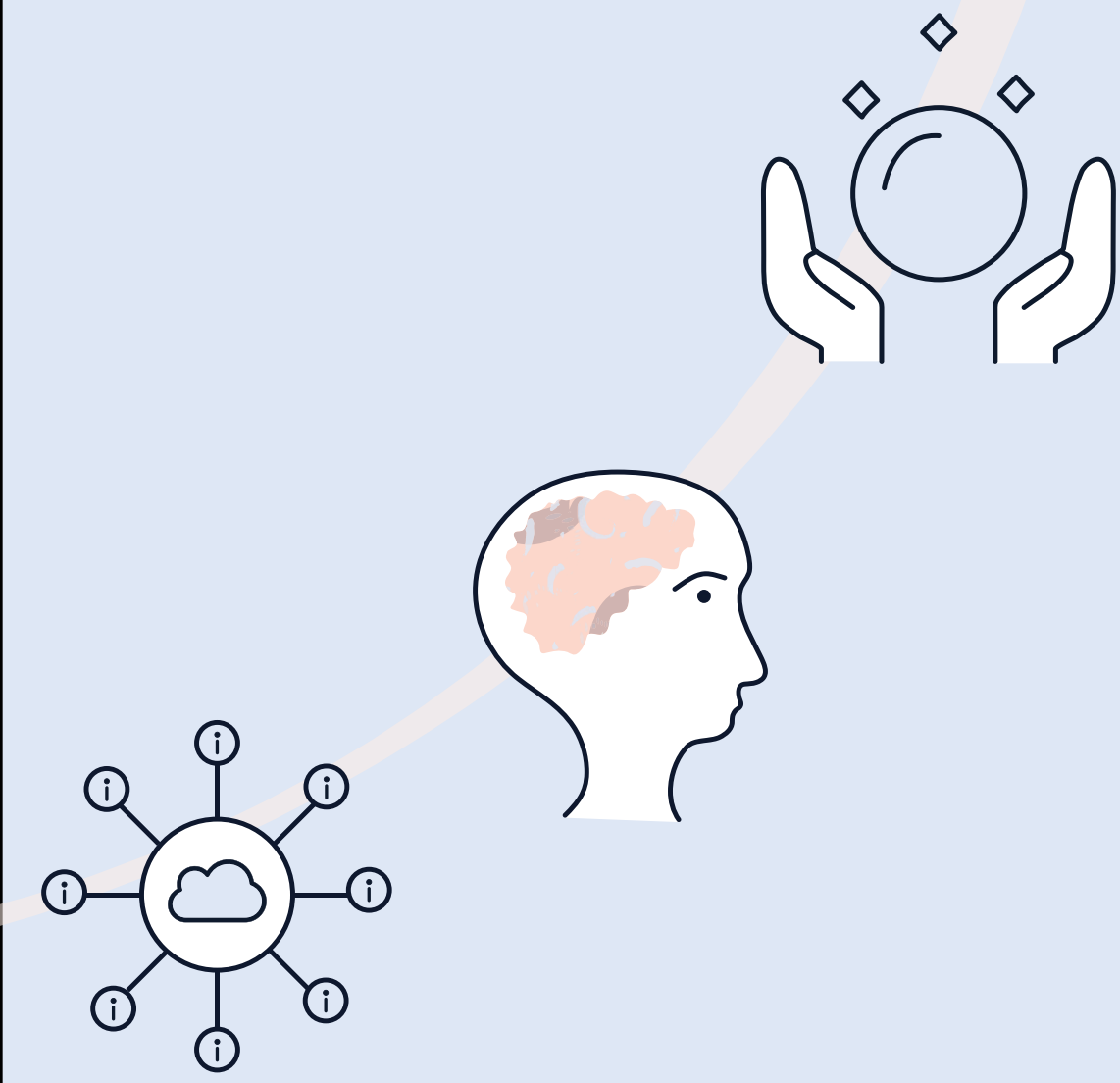

Data as Creative Material in the Strategic Design Process

Introducing data as external stimuli to
drive business model ideation

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Master thesis

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Summary

The role of data in the strategic design field is unquestionable and essential, being a catalyst for creativity and decision making. Design teams gather large amounts of data at the beginning of projects, to understand how the context of the problem looks like and how they can get inspired for the ideation of the outcomes. In the context of this Master thesis, data is the first pillar of an input-output processing system (figure 1), which is used in the field of strategic design (process) and can result in new business models (output).

Until now, design practitioners have relied highly on manual data saving (whiteboards, post-its and notebooks). Digital data saving, on the other hand, can ensure that data and the embedded knowledge are not lost or damaged and that can be easily retrieved. Especially within bigger teams where there are multiple data and knowledge creators, it so happens that the knowledge gap between novice and expert designers is large. This typically results in the hindering of quality of the outcomes of design projects, as team members are limited to their own data and knowledge accessible to them, as opposed to the entirety of the team.

The second pillar is the process, referred to as strategic design. Business Models Inc. (BMI), a design consultancy for strategy and innovation in Amsterdam, makes use of a variant of strategic design, which is known as Business Design. At BMI, data is used extensively in the understanding phase of the design project and ideation, where the goal is not only to get the Business Design team inspired but also the client, who co-creates with them. The type of data that they make use of is therefore a combination of quantitative (e.g. consumer surveys, market outlooks, financial statements of the client) and qualitative (e.g. their curated collection of business models, SWOT analysis, customer interviews and co-creation sessions). This type of data helps the team create new business models and value propositions, which are therefore the output of the input-output processing system.

There is an increasing trend in the design industry to start incorporating data science practices, allowing designers to have access to new insights which are up to date and can be shared among team members. This has been proposed in literature and applied already in the design industry, for instance, design consultancies already combining data science with design thinking tools.

The premise of this project starts with wondering how the ideation of new business models and value propositions could be further enriched if a data science approach would continue to be welcomed in the design field. The outcome of this project has explored what the best utilisation of data would be within the design process, hinting at an exploited usage of data in ideation. The final concept is a 3-horizon roadmap that exposes how BMI could firstly, organize their data; secondly, find it as efficiently as possible and thirdly, inspire a new customer segment in the creation of new business models and value propositions.

Keywords:
data, creativity, external stimulus, business models, digital transformation, strategic design

Abbreviations

Throughout the Master thesis, abbreviations are used to help with readability. These abbreviations are described below:

BMI

Business Models Inc., which is the company engaged in this graduation project

BD

Business design, most often referred to in this report as BD team

BDers

Business designers

BMC

Business model canvas

VPC

Value proposition canvas

PaG

Problem as Given

PaP

Problem as Perceived

Acknowledgments

For most people, finishing up their Master thesis at TUDelft has been either a 2-year Master program in a foreign country or a 5-year experience in their homeland. For me, it represents a 6-year chapter that is now being closed.

I came to The Netherlands, six and a half years ago. I was eighteen and didn't speak a word of the Dutch language. You can imagine how challenging it was to get through my Bachelor program taught fully in this not-so-aggressive-sounding language. This Master thesis, to me, not only shuts an era of study but an era of self-discovery and growth.

The last six months have been an amazing learning experience for me. I remember starting this project and only realizing after the kick-off meeting what this project was really about and what I had got myself into.

Some people might cringe a bit by hearing this, but I could not care less. I'm so extremely proud to be able to say that my graduation team has been all female-driven. My TUDelft team, consisting of Milene and Anne, who have guided me through this adventure. Milene, it's been a pleasure working with you finally. Your detail-oriented mentality helped me get thoughts straight and your kind words and support brought immense comfort. Anne, your positivity and mentality in that 'things will turn out fine' is really to be cherished.

Niki, my BMI mentor, who not only was a mentor but became a friend during these months. You brought light when there were mental clouds and brought enthusiasm where it was needed the most. Thank you for being so assertive while letting me take full ownership of this project.
I'd also want to thank my BMI team for always being so helpful and ready to have a call whenever I had any questions or things I wanted to test. I felt at home from the very first moment I set a foot in the office. Everybody that made some time available to have a call with me, especially at the beginning of the project, where I was mainly exploring options and knowledge gaps; thank you.

Now, onto the more emotional acknowledgments.

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My sister, Elena. I don't think I have enough words for this woman. She is the one I would truly do anything for. I am so extremely lucky to have her by my side. We are sisters by chance but we have become best friends by choice, and that's the best gift I could have ever wished for. She will soon start her university journey, which I know will be successful no matter what. But most importantly, I wish her all the happiness of this world and hope we make our interrail trip before I turn 26.

To my aunty and my uncle, Hilda and Robert, who have also been my rock throughout all these years of tears, sacrifice and changes. Thank you for letting me enter your home and hearts and help me develop myself into the woman I am now. Your are my second pair of parents, unconditionally loving and supportive. I wish we will soon get a chance to finally make our so-wanted trip to Denmark so you can show me around.

To my partner Frederik, who has supported me during the entirety of this thesis. Getting to you know has easily been the biggest surprise and most delightful gift of these last six months. I look forward to what life after this thesis will look like, alongside you.

I'd like to thank my large number of friends. You guys always made sure there was wine, smiles and laughs on the table, getting me through all these months of roller coaster. Chiara, Ines, Jan-Maarten, Joey and Jasper, Jurriaan, Kate, Noemi and Johan, Maria, Roy, Valerie, Vino and Zubeer. I hope we can celebrate all our future achievements in life together and ideally, with no fear of infecting each other.

Lastly, I would not want to forget Jessica from the IO service point. I must thank her for letting me use the studio almost all days a week even though she knew I officially could only use it for two. And for being such a helpful soul when I spilled my tea on my mac and she let me borrow the TU's one. That day was extremely productive despite the drama.

Figure 1: Input-output processing system that summarizes the main three pillars of this Master thesis

Table of Contents

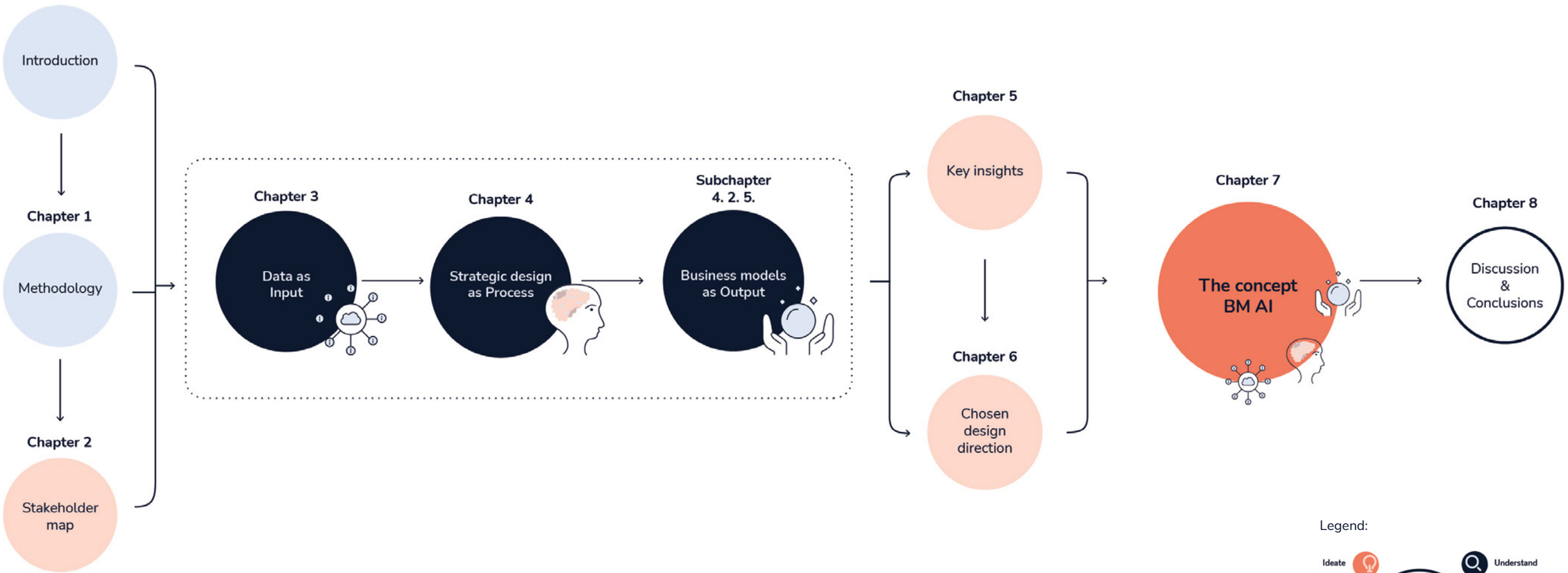
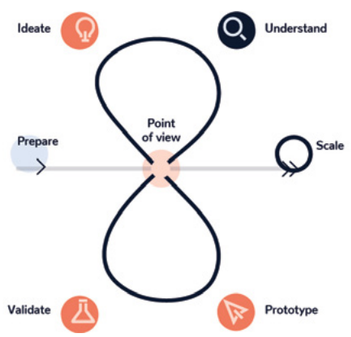


Figure 2: Visual table of contents of the Master thesis, following the double loop design process

Legend:



Introduction

The role of data in the strategic design field is unquestionable and essential, being a catalyst for creativity and decision making. Design teams gather large amounts of data at the beginning of projects, to understand how the context of the problem looks like and how they can get inspired for the ideation of the outcomes.

This Master thesis was done together with the design agency for strategy and innovation Business Models Inc. (BMI). From the different types of projects they offer clients, the 'accelerator' project is the one where they most explicitly make use of their design process called 'double loop' (figure 4). The double loop is a combination of the design thinking and agile methodologies and is conformed by seven steps: 1) prepare, 2) point of view, 3) understand, 4) ideate, 5) prototype, 6) validate and 7) scale.
The outcome of this type of project is (among others) 3-4 innovative business models (Business Models Inc., n.d.). Furthermore, the type of data they use is a combination of quantitative data (e.g. consumer surveys, market outlooks, trend analyses and financial statements) and qualitative data (e.g. customer interviews, SWOT analysis, observations and co-creation sessions).
BMI has large amounts of data they have generated and curated throughout the years, and they wondered how they could best make use of it.

This is how the main research question of the project became:

'How could designers make use of data to drive their creative process and unlock unforeseen connections and possibilities?'

Data is 'discrete, objective facts or observations, which are unorganized and unprocessed, and do not convey any specific meaning' (Al-Omari et al., 2016). For data to drive any potential decision making and provide value to organisations it must be analysed. Once analysed, data becomes 'information' according to Ackoff (1989) which is 'an aggregation of data that makes decision making easier' (Al-Omari et al., 2016).

In the field of design, information can serve several purposes: 1) reducing the uncertainty in the design process; 2) allowing for additional creativity; 3) supporting awareness of previous solutions; 4) creating an appropriate frame of reference for innovative design; 5) allowing for clear sharing and reception of knowledge within stakeholders, and 6) facilitating and accelerates the idea generation process (Gonçalves, 2016).

As presented by Gonçalves (2016), information has the potential to become inspirational for the designer to solve the problem at hand. An external stimulus could be any information that has been interpreted and prompts a reaction to explore the problem and solution space (Sarkar and Chakrabarti, 2008). An external stimulus can become inspirational only after it has been perceived, understood by a receiver (e.g. a designer) and included in the mental model of idea generation (Gonçalves, 2016).

These stimuli are mainly used during the 'understand' and 'ideate' steps of the double loop and are meant to inspire both the business designers and clients, as they participate in co-creation sessions. For these two phases, the best form of stimuli and interaction with it (idea generation technique) needed to be researched.

That is how the first sub question was phrased as:

'Which kind of data can be used, in which step(s) of BMI's design process can it be implemented and how can it fuel the design process? '

As observed at BMI, where a larger design team creates and retrieves information though, it easily happens that a gap in knowledge among expert and novice designers is experienced. The information they can find and potentially use as inspirational material is available in databases that make data sharing and retrieval quite challenging. Unless one exactly knows what to look for and where, finding relevant information for a new project is not easy, as it is highly dependent on how one researches (Gonçalves, 2016). Designers therefore struggle to find useful and potentially inspirational content that other teammates have gathered or created.

The field of data science can bring a different approach to data saving and retrieval and allow the organization's data to be fully unfolded in the design process, helping business designers access useful and inspirational stimuli seamlessly and helping clients reach inflection moments as quickly as possible.

This is how the second sub question was phrased as:

'Is there a way to efficiently gather and (re)use data?'

1. Methodology

This Master thesis was executed following a suitable design methodology, referred to as the double loop. The double loop is BMI's design method, which combines design thinking practices together with the agile methodology. I decided to follow the double loop in order to first, get used to BMI's tools and methods and second, fulfill my learning goal of iterating on the design process several times, as opposed to a slower (waterfall) design process. In the end, I performed four iterations on the design process.
This chapter answers the following questions:

Which method did I use during the project?

Which steps did I make and in which iteration?

How did the iterations and the respective actions help answer the research (sub) questions?

Which tools did I use during each step of the method to answer the research questions?

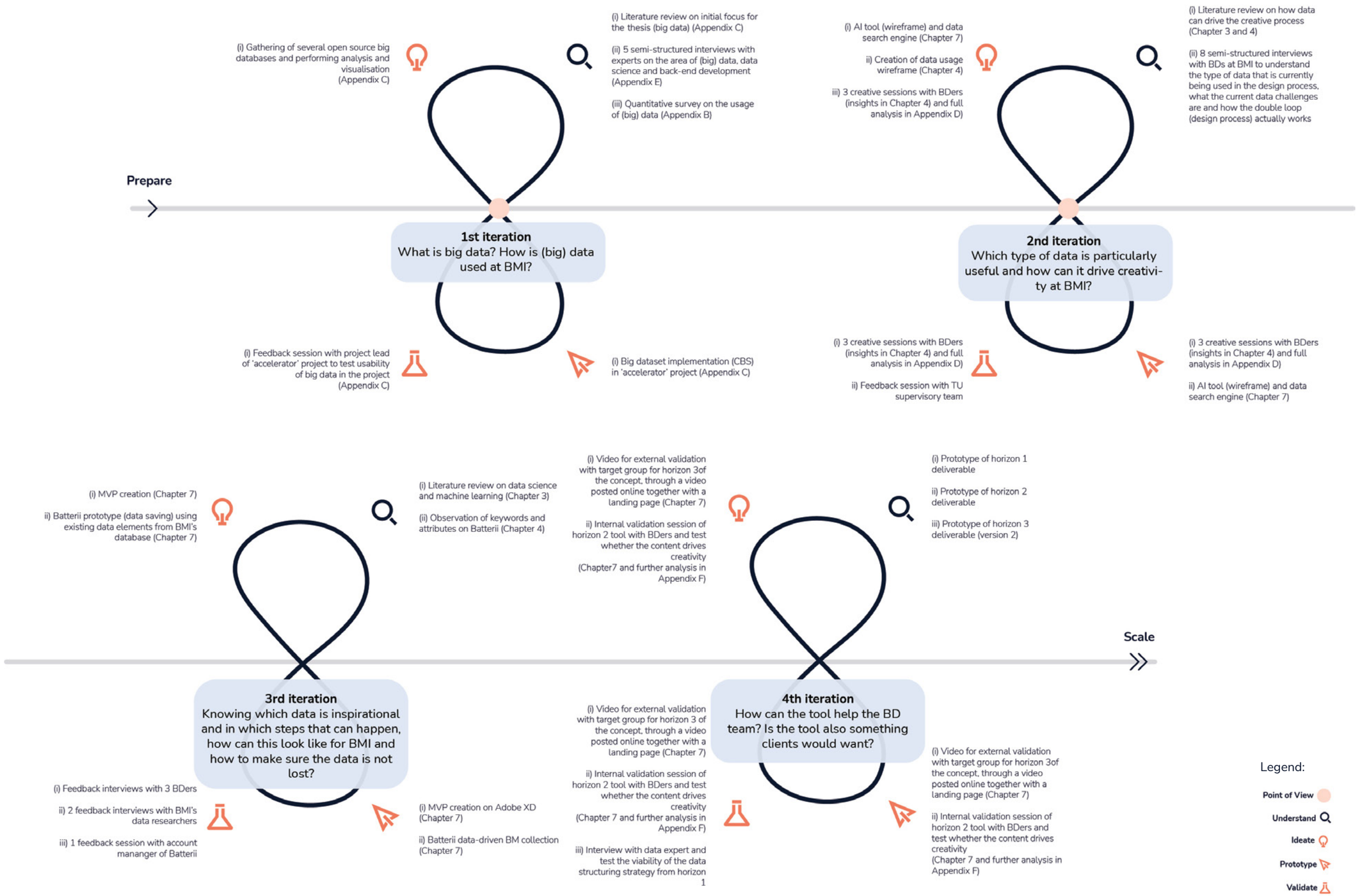


Figure 3: Method followed during the Master thesis, with the detailed steps taken in each design iteration

As it was explained in the introduction, this Master thesis started with the following research question:
'How could designers make use of data to drive their creative process and unlock unforeseen connections and possibilities?'
Next to that, there were two sub questions:
'Which kind of data can be used, in which step(s) of BMI's design process can it be implemented and how can it fuel the design process?'
'Is there a way to efficiently gather and (re)use data?'

In order to answer these research (sub) questions, I decided to follow the 'double loop' design method of BMI (figure 4), for two main reasons. The first, because I would get acquainted to BMI's way of working and that, in the end, would benefit the outcome of my thesis; and second, because I wanted to avoid a 'waterfall' type of project where decision making and ideation normally are delayed in the project.
This design method compiles the design thinking and the agile methodologies. It entails four main steps, which are: understand, ideate, prototype and validate and that are meant to be repeated several times. The aim behind this methodology is to guarantee an end result that has been validated thoroughly. Because of my personal learning goal related to increasing creativity and speeding decision making, applying this method allowed me to fulfill it.

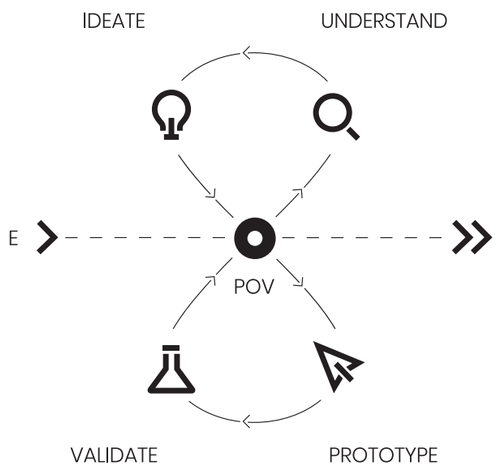


Figure 4: BMI's double loop design process

As this Master thesis was executed following the double loop design method, I have consciously colored the chapters (figure 2) according to the steps of the double loop. This way, the reader can quickly picture which step is being represented in each chapter. Keep in mind, that a further distinction in each chapter is made through text, to separate knowledge acquired from literature review/desk research and knowledge gathered with my own research (e.g. the creative sessions I organized, facilitated and analyzed)
As the reader might observe in the entirety of the report, the same color scheme was applied in all visual representations of the double loop. In the case of the steps of 'ideate', 'prototype' and 'validate' which, in the table of contents all share the same color, an extra distinction has been made through its respective icons.

As a result of this selected approach, I underwent four iterations in the design process (figure 3). This figure showcases in a readable and neat way all four iterations of the double loop, which steps were taken in each and which questions each iteration answered.
The extensive set of canvases that are used at BMI during the design process helped me synthesize my created knowledge and also get used to the way of working of BMI. Throughout the project, I gathered initial research, created experiments to validate assumptions, ideated several prototypes and validated them on multiple occasions.

The 1st iteration was solely executed to find out whether big data could be of any creative material value to BMI. In order to understand what big data was and how it could potentially be implemented in the design process, I executed literature review on the theme and interviewed experts in the field, among the other activities I underwent in this first design iteration. These interviews were semi-structured and analyzed following the technique of 'process coding' (Saldana, 2015).

After the 1st iteration, I realized there was an underlying problem to the use of data at BMI I was not aware of and that dealt with the current way the information was being stored. I then had to change my 'point of view' and realize big data was not within the current scope of the capabilities and interest of the company. At that moment, I started looking into what the actual problem was and how it was caused, so I could afterwards explore how to solve my actual research (sub) questions. I used the problem statement radar canvas (figure 24) to thoroughly understand the problem at hand.

In the second iteration, the literature review executed in the 'understand' step helped me conclude that data must be analyzed in order to become useful information. Also, I started comprehending which type of information works best as external stimuli for clients. Through the semi-structured interviews I executed internally at BMI (Appendix E) it became clear that the information was mainly being used in the 'understand' step, but that there was untouched potential in 'ideate'. Furthermore, novice designers struggled to find relevant information to inspire themselves and clients. For that reason, three creative sessions with BDers individually were carried out, where I experimented with the type of stimuli they were given and which form stimulated them the most during ideation.
Furthermore, the AI and search engine wireframe I prototyped already gave me hints into how data could be best structured (keywords) to ensure faster retrieval.

After this second design iteration the problem statement was properly phrased and can be found in Chapter 7.1. I comprehended that in order for data to be of any creative value for the BD team it first needed to be stored in a way that data sharing could be unfolded within the organization. Solving the challenge of data structuring and saving could ensure that it could be exploited within the organization as creative material.

At that point, the type of external stimuli that was the most relevant and useful to the BD team was not entirely explored. My hypothesis during the 2nd iteration was that the level of abstraction of the external stimuli had the most impact in its usefulness. However after analyzing the recordings and outcomes of the creative sessions, I understood that the type of stimuli had to be scoped down to its actual application during an 'ideate' session. The most used canvas during an idea generation session was the BMC together with the techniques of brainstorming, freshwatching and high level questions that can trigger inflection moments in the client.

In the third design iteration the focus was to scope down the project, understand which type of data was actually inspirational, what the interaction with the external stimuli would be like and identify ways to ensure seamless data saving and retrieval. Next to doing literature review into the topic of data science and observation of the Batterii platforms, I took a hands on approach. I created a minimum viable product (MVP) and a data-driven BM library on Batterii. These prototypes were tested and validated with stakeholders inside and outside BMI. This

approach guaranteed that the form of the external stimuli, the interaction with it and the data saving strategy were validated with experts in the field of data science and back-end development, which enhanced the quality of the prototypes.

The final design iteration was meant to substantially present a final concept that had been validated in the aspects of 'desirability', 'viability' and 'feasibility'. To test its feasibility and hence whether the concept would drive creativity in the idea generation process, the content belonging to the tool from horizon 2 was tested internally with 4 novice BDers. Moreover, the desirability aspect was tested with the online followers of BMI through a short explanatory video that captured the value of the Business Model Ideation tool for its potential users. The viability of the tool from horizon 1 was explored during an interview with a data expert, which advised several approaches to how BMI's database could be built.

In order to increase the speed of the design process and therefore bring agile aspects to it, I also used the technique of 'retrospectives' to improve my process quicker (figure 5). During each weekly retrospective, I created an overview of the steps taken the previous week, what went well, what could be improved and what the actionable points for the starting week would be. The retrospectives, which I did every Monday, helped me understand what did not go so well the previous week and how the starting one could be improved.

Lastly, as previously mentioned, I also made use of the canvases that BDers at BMI normally apply in the design process. Throughout the project, the following canvases were used:
For the 'understand' step: Value proposition canvas, problem statement radar
For the 'ideate' step: Wall of ideas canvas, design criteria canvas, experiment canvas, context canvas, business model canvas
For the 'prototype' step: Experiment canvas
For the 'validate' step: Experiment canvas
Throughout the project: Retrospective canvas, risky assumptions canvas and storytelling canvas. The latter I used as well for crafting the meetings with the TU advisory team, the whole BMI team and the general audience for the final presentation

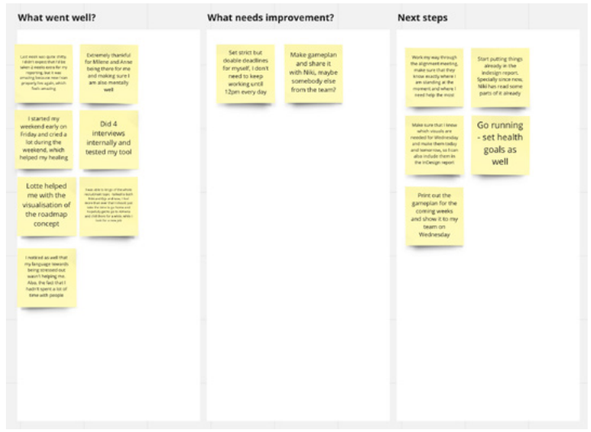


Figure 5: Weekly retrospectives

Which method did I use during the project?
I used the double loop design method, which is also BMI's design method. This method is a combination of the design thinking and agile methodologies, which suited my personality as a designer very well.

Which steps did I make and in which iteration?
I concluded the Master thesis with four iterations in total. In each iteration I carried out all four design steps of the double loop: understand, ideate, prototype and validate. In each iteration on average I executed 8 activities belonging to these four steps.

How did the iterations and the respective actions help answer the research (sub) questions?
The first iteration helped me shift the focus of the thesis from big data to the type of data that BMI currently makes use of and that has a lot of potential.
The second iteration helped me discover much more in detail what this information was and how it could drive the creative process.
The third and fourth iterations were much more targeted at the MVP I had developed and helped me build the roadmap strategy and tangible concepts that this project reveals in Chapter 7.

Which tools did she use during each step of the method to answer the research questions?
During the entirety of the thesis I used the BMI canvases belonging to all four design steps, which helped me understand the design process of BMI much better and also the pains and challenges of my main target groups (the BDers, BMI's clients and the data researchers). Also I used the retrospective technique in which I reflected on my progress the week prior and created actionable points for the next one

2. Stakeholder map and scope of Master thesis

To understand the context of this project, it is important to plot which parties were involved in the execution of it and what the scope is. I took the major role in the execution and was aware that achieving my personal goals was essential. This chapter, therefore, answers the questions:

Which parties were involved in this Master thesis?

What is the scope?

How can the different stakeholders benefit from this project?

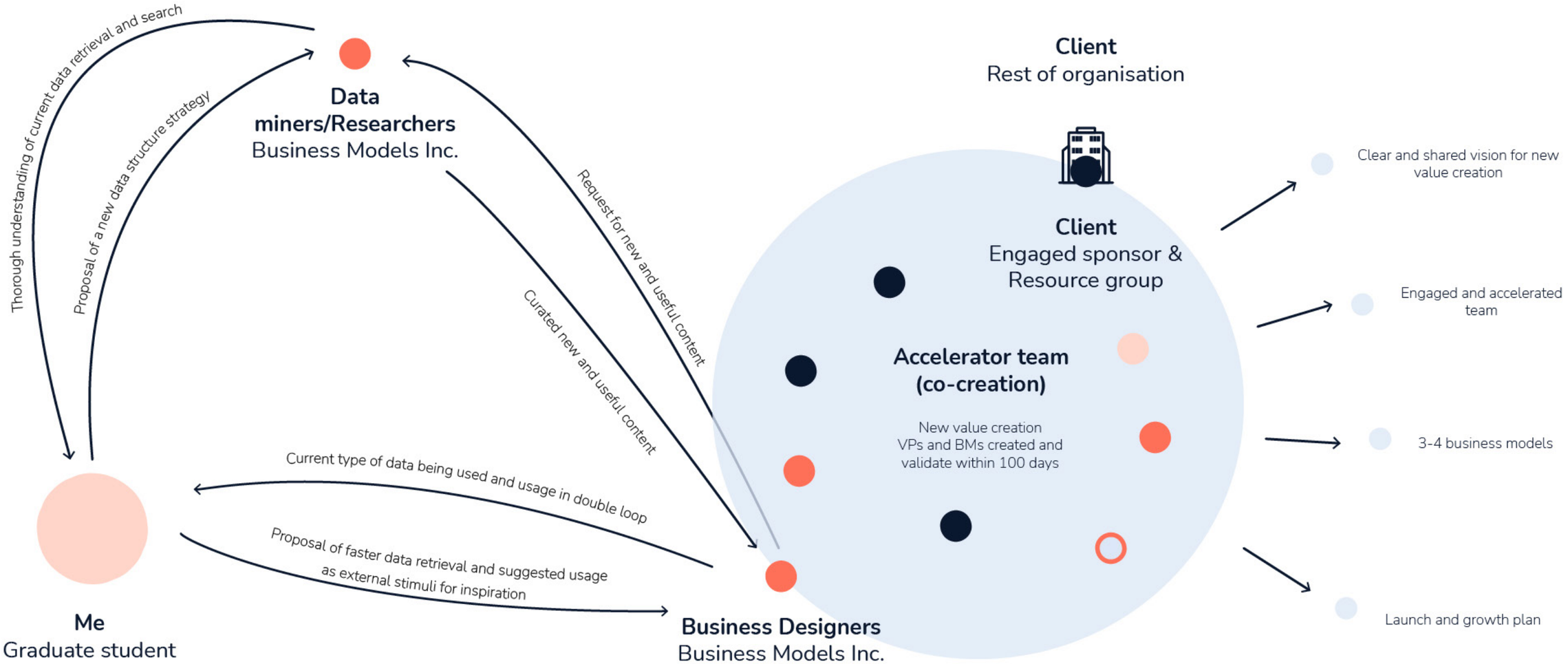


Figure 6: Stakeholder map within the context of the Master thesis (the 'accelerator' project)

Graduating student: Me

I found the topic of using data for design creativity especially interesting while doing my internship at Unilever B.V., six months prior to the start of the Master thesis. During my experience at the Customer Market Insights department, I worked closely with data scientists and executed data analyses for several European homecare products.
The performance of these products was tracked and mainly sales and marketing decisions were made upon them. Furthermore, extensive amounts of data were analyzed and visualized for innovation workshops, but I realized the decisions being made mainly covered again marketing and sales decisions. As a designer, I wondered if more daring, innovative decisions could be made with the same data sets.

My main learning goal for this thesis was to try to make data a playable and visually attractive element (a creative material) designers could use to drive idea generation. This topic is highly creative and deals with several stakeholders who, in the end, would highly benefit from the outcome.
However, as a designer, the outcome of my previous projects were not as creative as they could have been, which in hindsight, was highly related to the nature of the methodology used. These projects resembled the 'waterfall' method, where decision-making, ideation, prototyping and validation were delayed. This has always left a sour feeling in me because my concepts would be very broad and not validated enough.
Thanks to my entrepreneurial adventures though, I learned this could be avoided by using an agile methodology.

This Master thesis was therefore the perfect occasion to apply this agile methodology in my latest project as a TUDelft student, which ideally, would boost my creative side more.

Applying an agile methodology to my Master thesis was my second learning goal.

Furthermore, my other ambition was to maintain a healthy work-life balance during the thesis and make sure I would not end up 'burned out'. I promised myself I would work productively during the week, but allow my brain and body to relax properly during the weekend.

Company involved: BMI

Business Models Inc (BMI) is a design agency for strategy and innovation in Amsterdam. Its clients, belonging to various industries and mostly being large corporates (both B2B and B2C), require their help to create innovative business models in order to stay relevant to their customers, now and in the future (Business Models Inc., n.d.)

BMI is the company involved in this project that allowed me to have a closer look into their design practice and explore the possible solutions to my research questions. In their daily work, they make use of data to come up with innovative business models and value propositions for their clients. For them, this project was interesting because it would show the team the power of the qualitative and quantitative data that they typically use and have gathered throughout the years, within the design process.

BMI helps their clients 'boost growth and positive impact by accelerating innovation and entrepreneurship inside its client's organization' (Business Models Inc., n.d.) They offer to bring ambidexterity (O'Reilly III & Tushman, 2004) in the client's portfolio. The way this translates is by having four offerings in their portfolio: 'strategy', 'transform', 'accelerate' and 'educate'.

The main key differentiator of BMI to other design consultancies is the way they work with clients. BMI together with the client looks at the challenges within their organization and a certain way of working (project) will be jointly chosen. Furthermore, BMI promises to work together with the client, meaning that they will lead the client in their innovation journey, acting simultaneously as facilitators and content creators.
Refer to Appendix A for further information on BMI's current business model.

In regards to their design practice, BMI exercises 'Business Design' (Business Models Inc., n.d.), which is the design of business (Board of Innovation, n.d.) Business designers share a similar skillset to strategic designers, meaning that they aim to 'influence strategic decision-making within an organization' (Calabretta et al., 2016) in a poorly defined and highly complex (Duck, 2012) context. Business design projects, such as strategic design projects are intended to fight the ambiguity of the early stages of a project, the so-called 'fuzzy front end' (Herstatt, 2004)).

At BMI, their design method is called the 'double loop' (figure 4) and it incorporates the design thinking and agile methodologies. It consists of seven steps: prepare, point of view, understand, ideate, prototype, validate and scale. The steps of understand, ideate, prototype and validate are the main design-driven ones. The goal of the design method to have ideally executed several iterations. For each of these steps, BMI has a set of tools (canvases) that bring structure and coherence to their design work.

Scope of the Master thesis: The ‘accelerator’ project

The double loop design method is generally used for all project offerings, but more strongly during the ‘accelerator’ program. The ‘accelerator’ program promises clients new value creation (value propositions and business models) created and validated in just 100 days (Business Models Inc., n.d.) The end result of an ‘accelerator’ program consists of: a clear and shared vision for new value creation, 3-4 business models, launch and growth plan and an engaged and accelerated team (Business Models Inc., n.d.) (figure 6). The design outcomes are therefore closed-ended (Heijne & van der Meer, 2019)

The team working on the ‘accelerator’ program consists of a BMI team and a client team. This is derived from BMI’s way of working with clients, where they closely work and co-create with them.

The outcome of an ‘accelerator’ project is highly dependent on the innovation level of the project. Put in other words, how far out of the comfort zone the client wants to go. As proposed by McKinsey & Company (2009), organisations can achieve growth through a three horizon framework to work their way through to the future. BMI makes use of this framework in which horizon one is incremental innovation, horizon two is significant innovation and horizon three is radical innovation. Internally, the horizons are often given the colloquial names of: 1) within planet Earth, 2) somewhere in the moon and 3) towards Mars.

Data consumers: BMI’s Business Designers

During an ‘accelerator’ project, the BMI team is often composed of a client lead, project lead and 2-3 business designers (BDers).
The Business Design team (BD team) is the team that closely works with data and the client work. They make use of the double loop on a daily basis. This makes them my main target group for my intervention, or as a interviewed data scientist put it, they are the ‘data consumers’.

‘The solution has to have the main data consumer in mind’ (expert data scientist, interview)

BDers exercise two roles during the client projects; content creators and sense makers/ facilitators (Heijne & van der Meer, 2019). Their roles are dependent on the step of the double loop where the project is at. For instance, during an ‘understand’ session they come to the meeting with the client with a context canvas completely filled, hence, their role is that of content creator. On the other hand, during an ‘ideation’ session, their role is to trigger an inflection moment (Cardoso et al., 2016) in the client and to think of new ways to create value (sense makers/facilitators). Their challenges with data, as it will be seen in Chapter 4 are highly dependent therefore on the double loop step and their role.

At BMI, the level of expertise of the BDers is defined by three levels: junior (referred to in literature as ‘novice designer’), medior (or intermediate) and senior (referred to in literature as ‘expert designer’) Their level of expertise had an impact in the way they viewed data and worked with it. As it will be explained much more in detail in Chapter 4, novice designers tend to easily feel overwhelmed by the amount of information available internally, while expert designers rather trust their expertise and wisdom and rarely look at new data.
Because this distinction in expertise level is important to the final concept, novice and expert designers have visually been defined differently (figure 7). This distinction is visually consistent throughout the project and will come back in the following chapters.

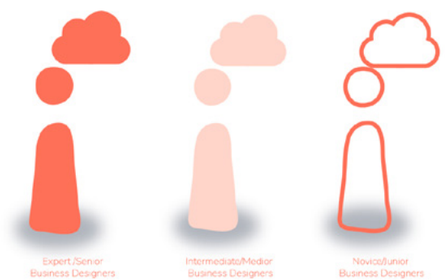


Figure 7: Visual distinction of Business Design expertise levels at BMI

Data beneficiaries/ consumers: BMI’s clients

BMI has a specific way of working with their clients. BMI believes the best outcomes of the projects are when the client is on board throughout the process. For that reason, the BD team always works with a small client team, consisting of 0-5 employees that normally work at the marketing, innovation or strategy departments of large corporates.

This client team though, has a high level of engagement with the project as they will work closely with the BD team. They are referred to as ‘sponsors’ within BMI as they are part of a larger organization and want to challenge the business as usual as seek for innovative solutions (van der Pijl et al., 2016, 27)). Moreover, they usually have to present clear results to a less-engaged team within the organization, such as a vice president or board.

During the execution of an ‘accelerator’ project, the sponsor client team is actively involved. Their role is what Heijne and van der Meer (2019) described in their book as the ‘resource group’. They provide data or their own market-specific knowledge, participate in co-creation workshops, etc...

Clients of BMI can benefit from a data-driven BMI, meaning that they can get content of quality during the ‘accelerator’ project. Or as a BMI colleague explained it:

‘In the end, the power of data is that we can create value for our clients’ (respondent, survey executed during 1st iteration)

Data miners: BMI's researchers

BMI has already been aware of the importance of data in their organization and aims at making it a more interesting value proposition for clients. There are two colleagues at the moment who, on a weekly basis, collect and curate new data. They, for instance, track new trends or analyse complete business models of interesting companies.

They support the BD team with finding useful information for the execution of projects and get therefore, questions regarding interesting examples of companies on a weekly basis.
For the context of the Master thesis, they were quite crucial as they understand which type of information is most useful for the BD team and how the BD team requests it.
As part of the ongoing digital transformation that BMI is already acting upon, the data researchers currently make use of a platform called Batterii (Batterii, n.d.). This platform is mainly used for digital consumer research (consumers record themselves while testing a product, for instance). However, it also has a data saving functionality, which BMI is using to some extent. As it will be further explained in Chapter 4, having access to this platform helped me understand how data could potentially be saved in the field of strategic design.

To answer the questions this chapter started with:

Which parties were involved in this Master thesis?
How can the different stakeholders benefit from this project?
The parties involved in this Master thesis are the graduating student (myself), the company (BMI), the business designers (BDers) at BMI who are the main 'data consumers', the data researchers at BMI and the clients of BMI, who ultimately can benefit from a data-driven approach.
I am aware of the major importance of my main ambitions and learning goals, while understanding that the end result must bring value to the four parties who can directly benefit.

What is the scope?
The specific scope of the thesis was the 'accelerator' project in which the end result is closed-ended (a clear and shared vision for new value creation, 3-4 business models, launch and growth plan and an engaged and accelerated team) in which the BD team works closely with the client.
The BD team takes therefore both the role of content creators but also facilitators, while the client takes the role of the resource group.

3. Data as input

The premise of this Master thesis involves data being creative material to the design process. This chapter covers a general introduction to the concept of data and the relevant topics that allow for it to drive creativity in strategic design. The content of this chapter is a mix between primary data (own research) and secondary data (desk research such as literature review).
These are the questions that this chapter will tackle:

What is data?

How is data analysed and why does it have to be analysed?

What types of data are there and how can it be acquired?

How is data used in strategic design and why?

How is data used as creative material in strategic design?

3. 1. General introduction to data

Data is ‘discrete, objective facts or observations, which are unorganized and unprocessed, and do not convey any specific meaning’ (Al-Omari et al., 2016).
Data is namely the plural to the Latin ‘datum’, which is ‘(thing) given’ (Online Etymology Dictionary, n.d.) Although this infers that data should be referred to as ‘data are’, in the current daily usage of the word, it is grammatically accepted to refer to it in its singular form: ‘data is’ (Bridgwater, 2018). In this Master thesis, data is being addressed in its colloquial, singular form.

A data-driven decision making (DDD) as explained by Provost and Fawcett (2013) allows for decisions to be based on analyzed data rather than on intuition and that may create economic value for organizations and society (De Mauro et al., 2016, 122-135) (Gandomi & Haider, 2015, 137-144).

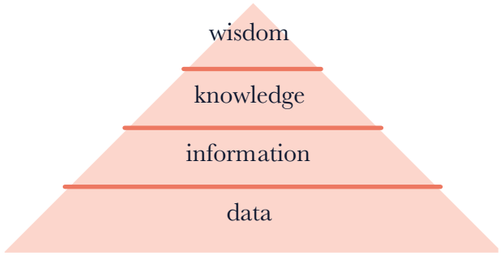


Figure 8: The DIKW hierarchy as proposed by Ackoff (1989)

3. 2. Data analysis

As data in itself does not convey any specific meaning, it must be analyzed for it to give useful information.
A known framework to understand how raw data can result in useful insights and that is used to explain the relation between data, information, knowledge and wisdom, is the DIKW hierarchy (figure 8) (Ackoff, 1989) (Rowley, 2007) (Jifaa & Linglingb, 2014). The DIKW hierarchy also describes the processes involved in the transformation of an element at a lower level (e.g. data) in the hierarchy to a higher level (e.g. information).

As described by Al-Omari et al. (2016), data are ‘discrete, objective facts or observations, which are unorganized and unprocessed, and do not convey any specific meaning’. Information is ‘an aggregation of data that makes decision making easier’. Furthermore, knowledge is divided into two categories: tacit and explicit knowledge. ‘Tacit knowledge is knowledge embedded in the human mind through experience and jobs [...] Explicit knowledge is knowledge codified and digitized in books, documents, reports, white papers, spreadsheets, memos, training courses, and the like’. Finally, ‘wisdom is the highest level of abstraction, with vision foresight and the ability to see beyond the horizon’.

3. 3. Data topics

There are several topics in which data can be gathered, depending on the content of the data. According to the Open Knowledge Foundation (n.d.) (open) data can be categorized in the following themes: culture, science, finance, statistics, weather and environment.

Next to this data theme categorization, the Know Center (2020) in the Safe-DEED data map proposed also other data types, meant to support data-driven business model innovation and can therefore be paraphrased as: Business driven. Within this category, social media data, customer rating (such as Yelp or Google), data from mobile payment system, sales history data per shop, promotional activity data, customer satisfaction data, geo location data (street maps) and calendar data (public holidays, holiday seasons, school holidays) are contained.
This latter theme is most relevant to the scope of this Master thesis, however the themes of ‘finance’ and ‘statistics’ are also important to the field of strategic design and the research that is done by BDers at the beginning of projects during the ‘understand’ phase. This will be further discussed in Chapter 4.

3. 4. Data types

These data topics indicated what the content of the data was, but not to which extent the data was explaining the phenomenon being researched. According to (Bornakke & Due, 2018, 1-16) the data universe can be further split by two distinctions: big-thin data and small-thick data (figure 9).

On the one hand, big-thin data sources are extensive in numbers but lack context linked to them. Furthermore, big data is defined by the (large) volume, (fast) velocity and (extensive) variety of the information being gathered (De Mauro et al., 2016, 122-135).

Examples of big-thin data are big datasets built from sensors, such as location data collected with a GPS sensor or the growing social media data (McSharry & Thomas, 2015). In order to make proper use of that information, technology and (computer) analytical methods are needed (Davenport et al., 2012, 22-24). It must be noted that normally in the design field, big-thick data is often referred to as quantitative data.

On the other hand, small-thick data (or qualitative data) responds to smaller amounts of data points which aim to help understand human behavior with detailed explanation on the human’s context (Muller et al., 2016). Examples of small-thick data are ethnographic observations, interviews with end users or co-creation sessions with clients or consumers (Bornakke & Due, 2018, 1-16) (Hox & Boeije, 2005). Small-thick data is normally analyzed by the researcher, therefore manually-driven.

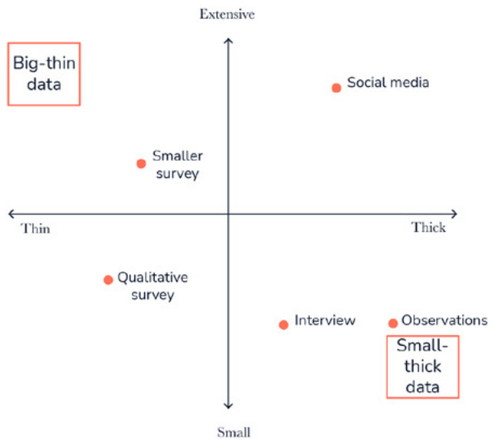


Figure 9: Adapted version of 'Split of the data universe in small-extensive and thick-thin data' by Bornakke and Due (2018). A qualitative survey can be made out of a Likert scale with a text box underneath to give further explanation

3. 4. 1. The field of data science and the analysis of big data

As part of my 1st design iteration I dove deeper into the field of big data, by acquiring, analyzing, visualizing, trying to implement it in the ideation process myself and interviewing data science experts.

For the case of big data, where advanced computational technology is required for its analysis (De Mauro et al., 2016, 122-135), the process of distilling useful insights from data is called data science (Jifaa & Linglingb, 2014). Data science is 'an interdisciplinary field aiming to turn data into real value [...] Value may be provided in the form of predictions, automated decisions, models learned from data, or any type of data visualization delivering insights' (van der Aalst, 2016).

There are several frameworks that consolidate the data processing method. One of them is the one proposed by Gandomi and Haider (2015). They proposed a wireframe that is composed of five stages (figure 10) and can be broken down into two sub-processes: data management and analytics. Data management includes three main steps: 1) Acquisition and recording; 2) extraction, cleaning and annotation and 3) integration, aggregation and representation. Data analytics entails 1) modeling and analysis and 2) interpretation. On the other hand, Woods (2019) proposed a framework that makes use of a less technical language and is more descriptive in the goal to be achieved in each step of the framework, which can be more applicable to the design field. Her framework includes five steps: 1) frame the problem, 2) get the data, 3) explore the data, 4) perform in-depth analysis and 5) communicate results.

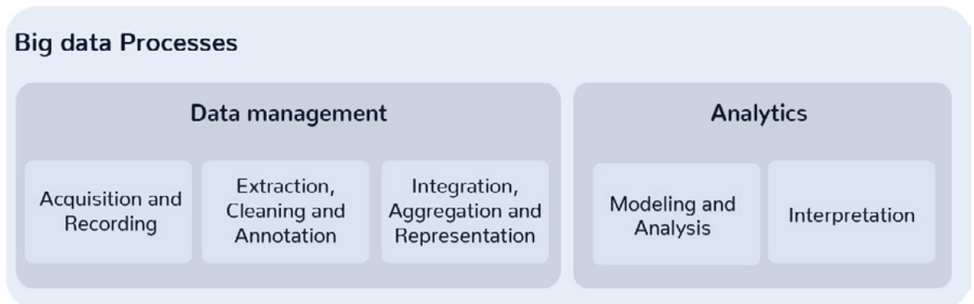


Figure 10: Processes for extracting insights from big data (Gandomi & Haider, 2015)

These two frameworks are somewhat related to the one presented by Ackoff (1989). Gandomi and Haider (2015) and Woods (2019) explain how data can become information, the steps one has to make in order to distill useful insights out of data. These useful insights are what Ackoff described as 'information'. The other two higher elements of the DIKW hierarchy presented by Ackoff (1989) may be reached by the human who is to understand the information.

A common term linked to data science is machine learning. We see machine learning nowadays in e.g. online search, in recommendation engines or image recognition (G, 2017). Machine learning studies computer algorithms that are trained with data and automatically improve through training (Muller et al., 2016).
These computer algorithms must be trained either supervised or unsupervised and are able to make predictions based on the training data it was fed.

3. 5. Data acquisition

It is commonly thought that data is easily accessible online. This is true for a part of the data types that have been introduced. In the data universe, however, not all data present online is open source. The data themes presented by the Open Knowledge Foundation are what they name 'open data', which is data anyone could have access to. On the other hand, the data types introduced by the Know Center are typically reserved for certain parties that have ownership to it. Therefore, the ownership of the data is an important and determining factor to the classification of data.

With data being available online, not all data must come from one's own research. In the current world, data does not have to be collected by the individual performing the research, but can come from other sources. These sources from which data can be acquired can be summarised in three categories: primary, secondary and third-party data.

Primary data is data owned by oneself, or in the case of organisations, owned by the organization itself (Know Center, 2020). An example of primary data is, for instance, data gathered for a study by the researcher in charge of it (Hox & Boeije, 2005). In the case of an organization, primary data can be the tracked consumer's behaviour through the company's app, website or completed surveys (Lotame, 2019).

As described by Hox and Boeije (2005), secondary data is data collected previously by other organisations or individuals, with or without the purpose to support research. The ownership of secondary data lies on the second party, therefore, accessing it might involve a purchase.

If the second party is a public organization such as the Centraal Bureau voor de Statistiek (Statistics Netherlands), data can be publicly accessed (Opendata CBS, n.d.).

Lastly, there exists what Lotame (2019) names third-party data or tertiary. Tertiary data is data gathered by third parties that are not involved in the data collection, but rather pay the primary data creators to collect their data sets. These third parties normally offer their collected data sets at a price, by paying a subscription to the platform for example. Platforms such as Statista (Statista, n.d.) or Google Dataset Search (Google, n.d.) are examples of third parties.

3. 6. Data saving

In the data science field, data must always be stored, ideally starting from its rawest form, before it has been analysed. One of the expert data scientists interviewed in the 1st design ideation defined the process of data saving as the following:

'How do you eat an elephant? In small pieces'

He was explaining here how it is much easier to save the data before it has been analysed. This makes it useful for other projects to retrieve previously acquired datasets which could come in handy.

In order to retrieve older data, data scientists make use of a 'data catalog' which 'informs customers about available data sets and metadata around a topic and assists users in locating it quickly' (Knight, 2017) (IBM Cloud Education, 2020). The data catalog is built by using tags and labels that represent attributes that define the dataset. A proper and suitable data structure is of great importance before building a data catalog.
Using a data catalog is highly beneficial as it facilitates finding data that has already been created within an organization. Otherwise, data scientists might find themselves going back and forth trying to find data that has already been created, rely on the help of colleagues to find the datasets or simply work with familiar datasets (IBM Cloud Education, 2020). This not only affects the quality of the work presented but also causes repeating work that has previously been done.

The covid-19 pandemic and its respective consequences (not being able to go to offices for instance) has made the traditional data saving techniques used in design teams challenging. This is why there is a shift already taking place to platforms such as Miro and Mural where creative teams can collaborate together while being remotely. This already is a step forward to a digitalised design practice.

After my 1st iteration I realized that the way in which design teams save the collected data and information takes form in finished reports, presentation decks, etc (explicit knowledge)... This is a difference I was able to spot in the design practice as opposed to how big data is treated in the field of data science.

3. 7. Data usage in the strategic design field

The design field has utilised data (normally a combination of quantitative and qualitative) to drive decision making in the development of products, services and systems (Speed & Oberlander, 2016).
Approaches such as data-enabled design (van Kollenburg & Bogers, 2019), data-driven design (Gorkovenko et al., 2020), design from data, design with data, design by data (Speed & Oberlander, 2016) and the design inquiry through data (Kun, 2020) are already present in the design field.

Data supports strategic design projects in the fuzzy front end and supports designers in making decisions that they would otherwise have to make based on their gut feeling and intuition (De Mauro et al., 2016, 122-135).
Strategic design normally makes use of quantitative data (e.g. consumer surveys, market outlooks, trend analyses and financial statements) and qualitative data (e.g. customer interviews, SWOT analysis, observations and co-creation sessions).
Referring to the classification of data given at the beginning of this chapter, we can observe that the type of topics mostly used in strategic design refer to the 'business-driven' topic.
Also, for competitor and market analyses for instance, financial and statistics related data might come in handy.
Strategic designers might acquire this data by themselves (primary data), accessing it from a second-hand party (e.g. trend reports) or a third-party (e.g. internet search).

Data in itself, as it has been explained at the beginning of this chapter, does not provide meaningful insights. Data must be analysed, losing its raw nature and becoming, as proposed by Ackoff (1989), 'information'.
This is well explained in figure 10 by Lu (2020), where it can be understood that data must be processed in order to be of informing value to creativity in the design process. In the model presented by Gonçalves (2016), information can further drive and influence the design process in the following ways:

- **i)** reducing the uncertainty in the design process
- **ii)** allowing for additional creativity
- **iii)** supporting awareness of previous solutions
- **iv)** creating an appropriate frame of reference for innovative design
- **v)** allowing for clear sharing and reception of knowledge within stakeholders
- **vi)** facilitating and accelerates the idea generation process

According to Speed and Oberlander (2016) data usage takes place before and during the design process. This means that data can be creative material in the different steps of the design process.
For instance, during the empathise and define phase (or what is referred to as 'point of view' and 'understand' steps in BMI's double loop) the analysed data (information) serves the principal purpose of assisting the designer in finding a strategic path to take in the project and paint an initial context for the problem at hand.
During the ideation phase, the information gathered is meant to drive creativity in the divergence (as many possible ideas are created) and convergence (narrowing down to the best idea) stages of ideation (figure 12), while using idea generation techniques such as 'brainstorming' (Minah, n.d.).
The purpose of information during the prototype and test (prototype and validate in the double loop) phases is meant for validation and refinement of the ideas or concept that was ideated. It is limited to

the boundaries of the intervention that the design team creates, as I observed during the interviews in my 2nd design ideation with the BD team.

3. 7. 1 Information as external stimulus for creativity

Information can facilitate the idea generation process, allowing designers to think from different perspectives and allowing different possibilities to appear (Gonçalves et al., 2016). As explained by Gonçalves (2016), information can act as external stimuli in the idea generation process and influence the problem-solving in the end.
Information can serve as material for inspiration in the design process and therefore driving creativity. Creativity, as defined by Amabile (1996) is 'the process that leads to novel and useful solutions to given problems'. There are two main aspects to creativity: diverging and converging, which is also referred to as the 'creative diamond' (figure 12). Information can be, as the title of this Master thesis already hinted at, material that can assist the creative process of design, therefore, supporting both divergence and convergence. The divergence element of creativity can be measured according to (Heijne & van der Meer, 2019) by observing the following four aspects:

i) Fluency: the number of options per time unit
ii) Flexibility: the number of categories the options are based on or fit in
iii) Elaboration: the depth or filling out the option and
iv) Originality: the degree of newness of the options

Convergence can be measured by looking at two criteria: usefulness (effective and answering the problem constraints) and novelty (being original, unique, surprising) (e.g., Stein, 1953; Lubart, 1994;; Sawyer, 2006; Boden, 1994; Amabile, 1996; Hennessey and Amabile, 2010; Weisberg, 1993; Sarkar and Chakrabarti, 2007).

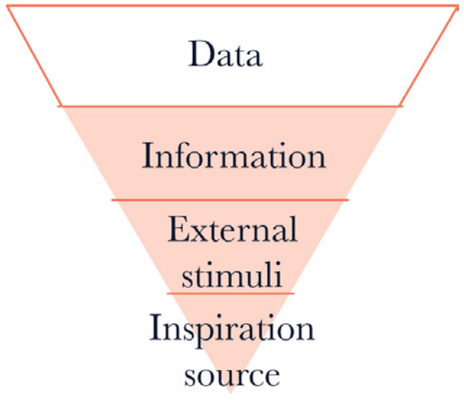


Figure 11: Information, external stimuli and inspiration source by Gonçalves (2016) and Data in the creativity design process (Lu, 2020)

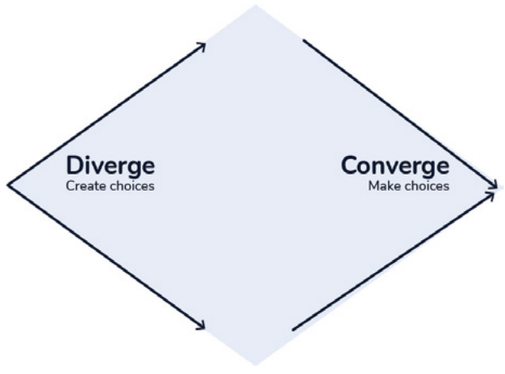


Figure 12: The 'creative diamond', which is formed by divergent and convergent thinking (IDEO, n.d.)

When faced with a problem, designers might look for inspirational material to drive their creative thinking. According to (Gonçalves et al., 2016) there are three important stages of the inspiration process: keyword definition, stimuli search and stimuli selection.
Designers might try finding first similar solutions that help them establish a comparison to what has been done before (Pasman, 2003) and therefore look for stimuli that are relevant or similar to the context of the problem at hand.
One of the ways to classify external stimuli is, therefore, in regards to how related they are to the context of the problem, ranging from distantly to closely-related (Gonçalves et al., 2016).
Furthermore, a stimulus could take form in visual, textual or other media, such as audible, tactile or three dimensional (Sakar & Chakrabarti, 2011) (Gonçalves et al., 2016).

The search for external stimuli according to (Gonçalves et al., 2016) can be active, passive or random active. When a designer is actively looking for stimuli there tends to be a purpose in the search. This search tends to lead to closely-related stimuli.
When passively searching, a designer might not have keywords nor the intention to search.
Lastly, when randomly actively searching for stimuli, there might be no keyword but an intention to find. These last two ways to search for stimuli normally tend to lead to distantly-related stimuli.

Lastly, when selecting external stimuli, according to (Gonçalves et al., 2016) a designer might do so based on the following criteria:

Based on relevance: perceived relation to the problem at hand
Based on recognition: stimuli that designers recognize from previous experiences
Based on verification: to validate ideas
Based on reliability: how reliable a stimuli seemed to be
Based on curiosity: because of how new the stimuli seemed

An external stimulus may become inspiration to solve the problem at hand. However, this is not a straightforward process as there is no certainty that an external stimulus might trigger the generation of more creative outcomes than another (e.g., Cai, Do and Zimring, 2010) and is highly dependent on the designer's experience and preferences (Gonçalves, 2016).

To answer the questions this chapter started with:

What is data?
Data is ‘discrete, objective facts or observations, which are unorganized and unprocessed, and do not convey any specific meaning’ (Al-Omari et al., 2016)

How is data analyzed and why does it have to be analyzed?
Data must be analyzed to be able to give valuable insights and drive strategic decision making. Once data is analyzed, it becomes ‘information’. Once ‘information’ is being used in reports, documents or stored in one’s mind it becomes ‘knowledge’, which can potentially lead to one’s ‘wisdom’, the ultimate level of abstraction and vision foresight.

What types of data are there and how can it be acquired?
Data in topics such as culture, science, finance, statistics, environment and business-driven can be found. Nowadays, one does not have to acquire the data themselves but can rely on somebody else’s data. There are three ways in which one can acquire data. Primary data is data collected and owned by oneself. Secondary data is data somebody else has collected and normally can be accessed with a payment. Tertiary data is data that has been gathered by a party that was not involved in its collection, though has paid the data creators to make it accessible to others, normally online.

How is data used in strategic design and why?
Data supports strategic design projects in the fuzzy front end and supports designers in making decisions that they would otherwise have to make based on their gut feeling and intuition (De Mauro et al., 2016, 122-135).
Strategic design normally makes use of quantitative data (e.g. consumer surveys, market outlooks, trend analyses and financial statements) and qualitative data (e.g. customer interviews, SWOT analysis, observations and co-creation sessions).

How is data used as creative material in strategic design?
Information is used during all steps of the design process. During the ideation phase, however, information can act as external stimuli and prompt the designer with inspirational content that might help them be creative and solve the problem at hand.
External stimuli might be visual, textual or other media, such as audible, tactile or three dimensional. It can also be closely or distantly related to the context of the problem.
Designers go through a process when searching for external stimuli: keyword definition, stimuli search and stimuli selection.
When searching for stimuli, designers might do so actively, passively or randomly actively.
Lastly, selecting the stimuli might be motivated by its relevance to the context of the problem at hand, its recognition by the designer, as verification to the ideas generated, because of its reliability or because of the designer’s curiosity

4. Strategic design as process

BMI makes use of a type of strategic design which is called Business Design. Both strategic and business design make use of a combination of qualitative and quantitative data, which they use to drive their creativity and decision making. Data is therefore a driver for creativity, supporting divergence and convergence during ideation. Data is also used in the other steps of the double loop, for other purposes.
The previous chapter has given a detailed explanation of the topic of data and how it can be used in the strategic design process. This chapter will further explore the design process of the company (BMI), how they currently make use of data/information during each double loop step and what their current challenges with it are.
The content of this chapter is mainly based on my observations, interviews I executed and creative sessions I organized in the 2nd and 3rd iterations of the Master thesis.
This chapter will answer the questions:

What does the design process of an 'accelerator' project look like?

How does data/information fuel the design process (double loop)?

What type of data/information is used by BDers?

What are their current challenges with data usage?

4. 1. BMI's 'accelerator' project

As explained in Chapter 2, the scoped context of this Master thesis is the 'accelerator' project where the BD team co-creates with clients (resource group) and where the design process of the 'double loop' is explicitly used. In this chapter I expose the insights from the close observations and knowledge I gathered about how BDers get involved in the process of finding, selecting and using the most advantageous type of stimuli, for them and for the client.

An extremely important insight, which was observed during the creative sessions in my 3rd design iteration and that was explained in the stakeholder map (Chapter 2) is that BDers take two roles during an 'accelerator' project: They are simultaneously content creators and sense makers/facilitators.
The information gathered during the 'understand' phase is meant therefore to trigger a reasonable dissatisfaction in the client by depicting the current way of doing business and how there are some challenges to tackle. In the 'ideate' phase this information becomes external stimuli as it will be used to create inflection moments ('AHA moments') and inspire clients to think innovatively.

'The goal is to create 'aha moments' in the client and help them discover the opportunities of innovating their business' (expert BDer, creative session executed in the 3rd design iteration)

Inflection moments are, according to (Cardoso et al., 2016), 'a sequence of cognitive moves triggered by reflection on dissatisfaction (about the current situation), and in turn, facilitated by the formulation of high-level questions that steer the discourse into a new design direction'. The inflection moments normally take place during the step of 'ideate', where the current context of the company is shown, next to external stimuli to trigger the client to think innovatively.

Step of double loop	prepare	point of view	understand	ideate	prototype	validate	scale
Type of session	Alignment meeting with client	Alignment meeting with client	Meeting with client team	One-day ideation session with BD and client team	Alignment meetings to set up fast and low investment experiments	Alignment meetings to show results	'Accelerator' project handover
Goal	The engagement team of BMI understands which project would suit the client's needs best	Common understanding between BMI and client team of what the goal and direction to be achieved is	Mutual understanding of the client's context, customer needs and their current business model	Ideation of new business model options and value propositions	Set up fast and low investment experiments to validate assumptions in regards to the VPs and BMs that came out of the 'ideate' session	Showcase results from the prototypes and decide which VP and BM is worth pursuing in 'scate'	The client is ready to invest in this VP and scale it up
Role of Business Designer		Identification of company's challenge	Content creator in its majority (novice designers) Sense makers/facilitators towards client	The BD team crafts an ideation session (full day workshop) where they will trigger the client team to think of new value creation	Recall the BMs and VPs chosen from the 'ideate' session and show how they can be tested and with whom. Ask for help from client when needed	Showcase results, prepare final report	Deliver final report
Tools used	Team charter canvas	5 bold steps vision, Cover story, Design criteria and storytelling canvas	Context, value proposition and business model canvas, 5 bold steps and cover story canvas	Creative matrix, wall of ideas, innovation matrix and business model canvas Presentation (slides) and/or online session (Mural)	Prototype canvas	Riskiest assumptions, experiment and validation canvas	
Expected outcome	Selection of a suitable BMI program for client's needs and challenges	Filled canvases Client safaris (interviews) are scheduled and planned	Client and BD are on the same page in regards to the client's current business and the canvases have been filled.	Out of the box ideas that have to further be developed and validated 3-4 business model options, out of which, 1 is chosen for further development (prototype and validate)	A prototype of the most interesting VPs has been created	A report with the whole 'accelerator' process explained, which decisions were taken and how the client can scale this VP further within their organisatio	Client is ready to take the next step (invest)

Figure 13: Detailed explanation of an 'accelerator' project, based on (van der Pijl et al., 2016)

4. 2. Data usage during the ‘accelerator’ program

Also, as explained in Chapter 2, the outcome of the ‘accelerator’ project is highly dependent on how innovative the client wishes to be. The outcome of the project can either be 1) within planet earth , 2) somewhere in the moon and 3) towards Mars. These three different horizons are based on the three horizon framework by McKinsey & Company (2009). Horizon 1 is incremental innovation, Horizon 2 is significant innovation and Horizon 3 is radical innovation.

For further understanding of how an ‘accelerator’ project looks like and what the expected outcomes are, figure 13 was created and is based on the book of ‘Design A Better Business’ (van der Pijl et al., 2016).

The wireframe showed in figure 14 is a synthesis of what I observed and analysed of what happens during the double loop in the 2nd and 3rd design iterations of the Master thesis. The wireframe I created is specific to BMI’s usage of data and information and is an adaptation of the wireframes proposed by Gandomi and Haider (2015) and Woods (2019) presented in Chapter 3. This wireframe was validated by an expert data scientist during an interview in the 2nd design iteration of the Master thesis.

4. 2. 1. Relevant data identification

At the start of any ‘accelerator’ project, BDers have to analyse the data incoming and understand the relevancy of it for the project. BDers look for data similarly as a designer would, finding first similar solutions that help them establish a comparison to what has been done before (Pasman, 2003).
The type of data relevant to the BD team is a combination of qualitative and quantitative data, which, referring to the categorisation made in Chapter 3, deal with topics such as ‘business-driven’, ‘statistics’ or ‘finance’ that are in line with the strong focus of the consultancy on desirability and viability as aspects of innovation.
During the round of interviews done during the 2nd design iteration, I understood that BDers use the following main sources of data and information for the projects:

i) customer trends, pains and gains
ii) the client’s strategy and financial information
iii) trend research on financial, technological, demographic and competitor developments
iv) examples of other company’s business models and their shifts (own curated content and Intellectual Property: Business Model Shifts book)

For instance, if a company is looking to innovate their business model and make a shift in it, the BDer might be interested in looking at companies in the same industry that have made a similar shift previously.

This is in line with the research executed by (Gonçalves et al., 2016) where it was discussed that when designers are confronted with a problem, they seek first relevant stimuli with the aim to frame and solve the problem at hand (Goldschmidt 1997; Dorst & Cross 2001; Gonçalves, Cardoso & Badke-Schaub, 2013).

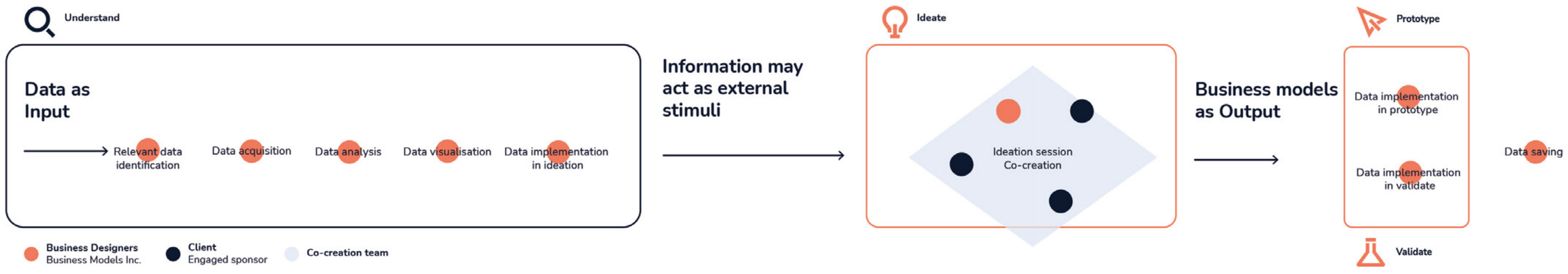


Figure 14: Data analysis and usage by the BD team during the double loop. Wireframe created the student

BDers therefore actively look for external stimuli that is closely-related.
I also understood that the phenomenon phrased as 'keyword definition' (Gonçalves et al., 2016) was also applicable to the BD team. Some of these keywords were the following:

i) industry
ii) country and,
iii) key terms such as AI or blockchain,

which I observed during my 2nd and 3rd design iterations.

Big data at BMI

The first design iteration I executed dealt with the potential usage of big data at BMI. However, as I was able to conclude, the usage of big data within BMI is not aligned with its core business and capabilities.

The concept of big data, which was introduced in the chapter of data as input, is novel for the company and its application is not clear among team members. The insights from the big data, such as "Fitness tracker device sales revenue worldwide from 2016 to 2022 (in billion U.S. dollars)" (Statista, n.d.) are somehow present in the design process, for instance in financial trend research.
However, it does not happen that a BD distills insights from an extensive raw dataset her/himself. After thorough understanding of the topic and what it could add to the BD team and organization, I decided to recalibrate and focus on the data that BMI currently makes use of.

The learnings from this first design iteration can be found in Appendix C, which can be useful for the company in case they ever were to explore more in detail the usability of big data in their design process.

4. 2. 2. Data acquisition

The three sources for general data acquisition (primary, secondary and 3rd party data) were explained in the previous chapter.
At BMI, BDers also collect data from these sources, which were studied in detail in the survey (Appendix B). Figures 14 and 15 give an overview of the several data access points that the BMI team indicated they used and that make 'stimuli search' (Gonçalves et al., 2016) possible within the organization.

For instance, as a 3rd party data, Google search was the most consulted source (86,7% of the cases), followed by client-provided data and existing data from previous cases and available in the current database, Dropbox (80% of the cases).

Furthermore, the platform Trendwatching was selected in 53,3% of the cases. This is a paid service that BMI makes use of and is therefore a secondary data provider. Trendwatching collects consumer insights and trends from around the world and has the aim of inciting teams to create purposeful innovation (Trendwatching, n.d.).

The book 'Business Model Shifts' (2020) created by BMI is also a main source of inspiration for the BD team together with the 160 examples of business models that have been studied by them throughout the years. The book is a curated compilation of some of the most interesting business model shifts that some companies have made and therefore a type of primary data.

In case of not being able to find useful data, BDers might ask their teammates on platforms such as Whatsapp or Microsoft teams for useful case studies (active search). I observed their asking behaviour throughout during the 2nd and 3rd design iteration and concluded that BDers ask for useful stimuli as follows:

'What is an example of a large organization in the healthcare industry in Germany that has recently introduced block chain in their business model?' (intermediate BDer, observation)

'Who has a business model of Amazon?' (novice BDer, interview)

'We are looking for inspirational strategic partnerships between brands, such as Kanye West x Adidas. Do you have any cool examples?' (expert BDer, interview)

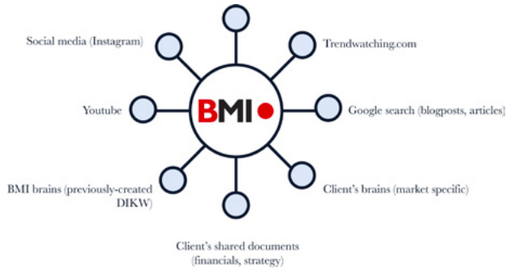


Figure 14: Data sources used at BMI as result of survey (Appendix B)

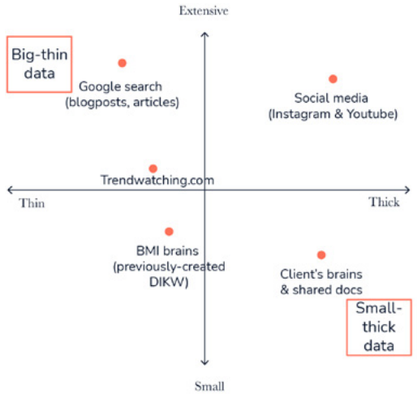


Figure 15: Data sources used at BMI, divided according to the 'split of the data universe' by Bornakke and Due (2018)

4. 2. 3. Data analysis

From Chapter 3, the important conclusion from the literature review was that data does not bring any useful insights until it has been analysed. Only then can it lead to strategic decision making and therefore becomes a higher-level entity in the DIKW hierarchy: information. This information can become external stimuli and be inspirational material for the co-creation team when solving the problem at hand. At BMI, the data is processed by BDers.

The data gathered for the 'understand' step is first selected based on its relevance to the problem at hand and then synthesised to paint the current picture of the client's company. BDers use the canvases relevant to this phase, which include the business model, value proposition and context canvases (figures 16, 17 and 18). They are simultaneously content creators and sense makers. They have to distill useful insights, not only for them but especially to explain the situation to the client, in a language they can relate to.
The information has also the potential to act as external stimuli (Gonçalves et al., 2016) to further inspire the resource group during the 'ideate' session (figure 19).

4. 2. 4. Data visualisation

As explained by (Mednick, 1962; Malaga, 2000) designers tend to have a preference to visual stimuli. This is no exception to BDers. The use of visuals not only is useful to them but highly inspirational to clients, as observed during the creative sessions I executed (Appendix D).
Using information as stimuli for inspiration is actually focused on inspiring the client and making sure that the material that BDers provide to them results in the most strategic and creative business model options. The stimuli are targeted at the client during the co-creation workshop, more than the only at the BDers. The impact this has on the external

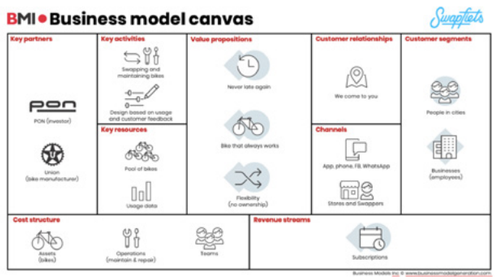


Figure 16: Example of a BMC, curated by BMI

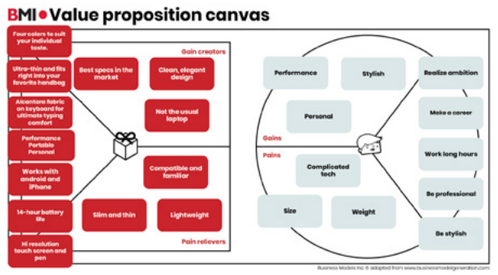


Figure 17: Example of a VPC

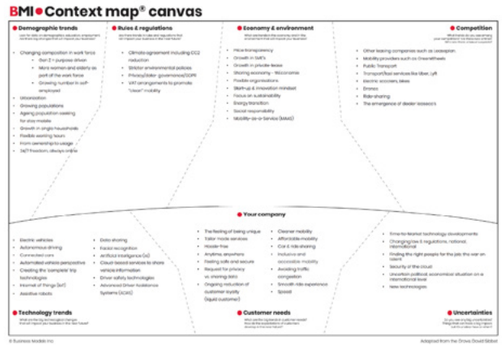


Figure 18: Example of a context canvas

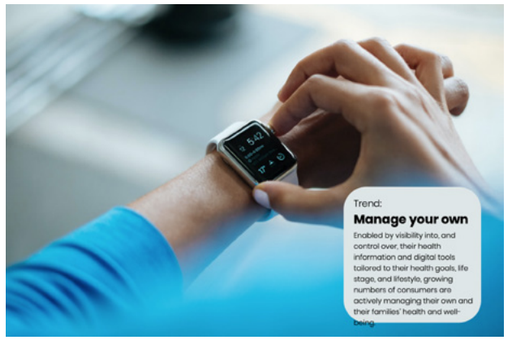


Figure 20: Example of the best combination for an external stimulus (pictorial and textual), especially for novice designers (insights from creative sessions (Appendix D))

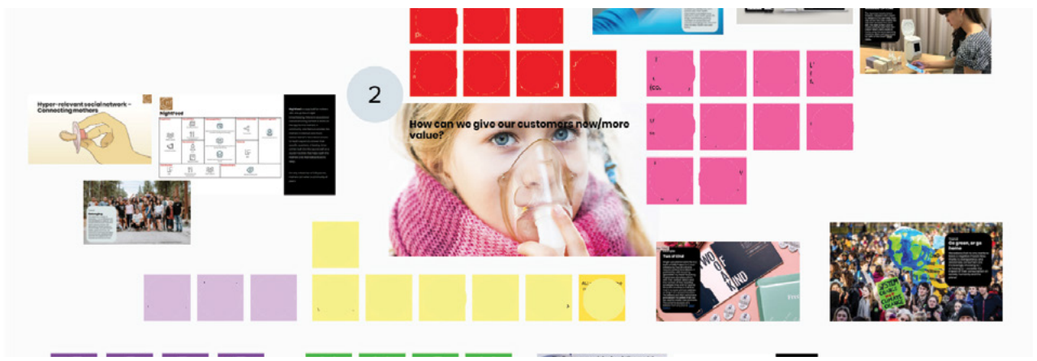


Figure 19: Example of an ideation session where information acts as external stimuli during idea geenration. Sensitive content (under NDA) has been removed

stimuli is in its form. The most ideal way to create an inflection moment (Cardoso et al., 2016) in the client, according to my 2nd and 3rd design iteration, was a combination of pictorial and textual (figure 20).
Normally, the information is also illustrated in presentation decks, where case studies of companies are presented and meant to spark a new way of thinking in the client: from execution driven to innovation driven.

4. 2. 5. Data implementation in ideation

For an 'accelerator' program, the main outcome is 3-4 business models. This outcome is close-ended, as it is a predictable final solution (Heijne & van der Meer, 2019) of this specific type of BMI project. The outcome is dependent on how innovative the client wants to be during the 'accelerator' project, which horizon they are willing to go to (incremental, significant or radical innovation). During an interview with an intermediate BDer, I understood that a successful ideation session is highly dependent on the level of innovation, which also determines the type of creativity.
In general, the beginning of an ideation session is driven by divergence (get as many ideas as possible) and hence the metrics of fluency, flexibility, originality and elaboration are most desired (in that order) (figure 21).

Now that BDers have gathered relevant information for the 'understand' phase and have discussed it with clients, it is implemented in the idea generation phase to create an inflection moment in them and generate ideas to solve the problem at hand (figure 19). The type of external stimuli presented to the client tends to be closely-related, being relevant to the problem at hand. Also, in order to spark creativity, BDers may gather examples of companies that are a bit out of the scope (distantly-related). This might mean that the stimulus chosen is a BMC from a company in a different industry or it has implemented a completely new technology or that it has made a business model shift.

The content that is actually used during an ideation session is however, first chosen by the BD team but afterwards consulted with the client before the actual ideation session takes place. It can happen that the BD team selects stimuli that are too out of the scope for the capabilities of the client.

During an ideation session BDers might make use of idea generation techniques such as 'brainstorming', 'freshwatching' or posing high-level questions (Cardoso et al., 2016) (figure 19) such as:

'How can we give our customers new/more value?' (example of a high-level question during an ideation session with client, observation)

The technique of 'freshwatching' is 'is an ideation method by which you mix and match (or overlay) business models from other companies, often totally outside of your business or industry, with your own business model to see what you can come up with' (van der Pijl et al., 2016)

Posing high level questions is a technique often used at BMI as well. The questions are typically scoped to the BMC and its 9 elements. Some examples are:

'What if your channel (element from BMC) were to be an app (channel from company X)?

This strategy seems to be extremely useful with clients as it gives them tangible inspirational examples of BMC elements that other companies implemented in their strategy.

The purpose of data during an 'ideate' session serves both divergence and convergence of creativity. Data serves the purpose to 1) trigger new ways of thinking in the BD team and the client by exploring other companies' BMC and 2) gather data to fill in these sections, during an 'ideate' session.

Figure 21: Example of the result of a physical ideation session, where sometimes more than 500 ideas are created (focus on fluency)

Business Models as Output

The Business Model Canvas (BMC) (figure 16) is by far the most used canvas at BMI, not only for the phase of 'understand' but also for 'ideate'. It showcases in a visual and tangible manner how an organization captures value for their customers, It consists of nine elements: customer segments, value proposition, revenue streams, channels, customer relationships, key activities, key resources, key partners and cost structure (Business Models Inc., n.d.) This is easily the most used canvas at BMI, not only for content creation (working on a project), but also as facilitator (inspiring a client to think of new ways to capture value based on another company's business model).
This canvas allows for convergence in the ideation session where the metrics of novelty and usefulness are desired. In fact, the outcome of an ideation session is 3-4 innovative business models that the co-creation team can further prototype and validate.

4. 2. 6. Data implementation in prototype and validate

In the stages of prototype and validation, the data gathered and analysed serves mostly the purpose of the concept validation and is therefore highly project-specific.

4. 2. 7. Data saving

Based on the results of the survey, the semi-structured interviews and literature review I understood that the data being gathered by BMI wasn't being exploited to its fullest extent. Even some BDers pointed at knowing that there is an immense amount of data and knowledge already in the organization but feeling that they execute the same trajectory when starting a new client project.

'I want to dive a bit deeper in the competitive landscape (E.g. competitor mapping) with the team. Not sure of any of you have some content hidden on a Dropbox that we could use / know the right tools but that could be really helpful' (novice designer, observation)

This is highly dependent on the database that is currently being used in the organization. Databases such as Dropbox are ideal for document storage, but are static in the way they do so. For instance, once a project is finished, all the deliverables are saved in folders, but the content cannot be separated from the end result (explicit knowledge). Furthermore, every team member had their personal way of saving the data; some save it in the client's folder, some in their own personal folder or even on Microsoft teams (see Appendix B for more information).

During the three creative sessions (Appendix D) this phenomenon seemed to have a large effect depending on the expertise level of the BD. Expert designers are able to search in their individual brains and look for content that would be relevant to the project. Novice designers, on the other hand, lack the years of experience and projects, and look therefore for new information every time online. They also confirmed avoiding looking at the BMI database (Dropbox) because it would mean inefficiency for their daily tasks and feeling overwhelmed, a phenomenon that was also discovered by Lu (2020).

Only the end deliverables can be retrieved, but 1) every team member has their own individual way to store and name the data which makes it extremely challenging to find again and 2) the information they used during the project (original articles, trends, examples of companies' business models) is now part of the final report and outcome, making it difficult to know which external stimuli worked well.

4. 3. Challenges with data at BMI

Based on the thorough understanding of data usage within BMI during the 2nd and 3rd ideation of the Master thesis, I was able to identify several pain points among BDers. Because of the duality in their roles, BDers face different challenges with information in the design process.

As content creators, they confront the following challenges:

What information is already out there?
How can I provide a higher confidence level to my design work?
How can the data we currently have help us unlock new and innovative connections?

As sense makers/facilitators (often encountered during an 'ideate' session), the BDers emphasised having the following challenges:

From the vast amount of valuable data we have, which elements work best to inspire my clients during ideation?
How can I use the research we did in 'understand' more explicitly in the double loop method?

As a consequence, I observed that BDers:

- **i)** do double amount of work (especially 'understand' phase)
- **ii)** do not leverage their 'understand' information throughout the rest of double loop
- **iii)** miss out links to data in client projects
- **iv)** are limited in creativity because the same data/content is used repeatedly

The challenges were more strongly identified among novice designers during the three creative sessions I carried out (Appendix D) (figure 22).

This is highly dependent on the database that is currently being used in the organization. Databases such as Dropbox are ideal for document storage, but are static in the way they do so. For instance, once a project is finished, all the deliverables are saved in folders, but the content cannot be separated from the end result. Furthermore, every team member had their personal way of saving the data; some save it in the client's folder, some in their own personal folder or even on Microsoft teams (see Appendix B for more information).

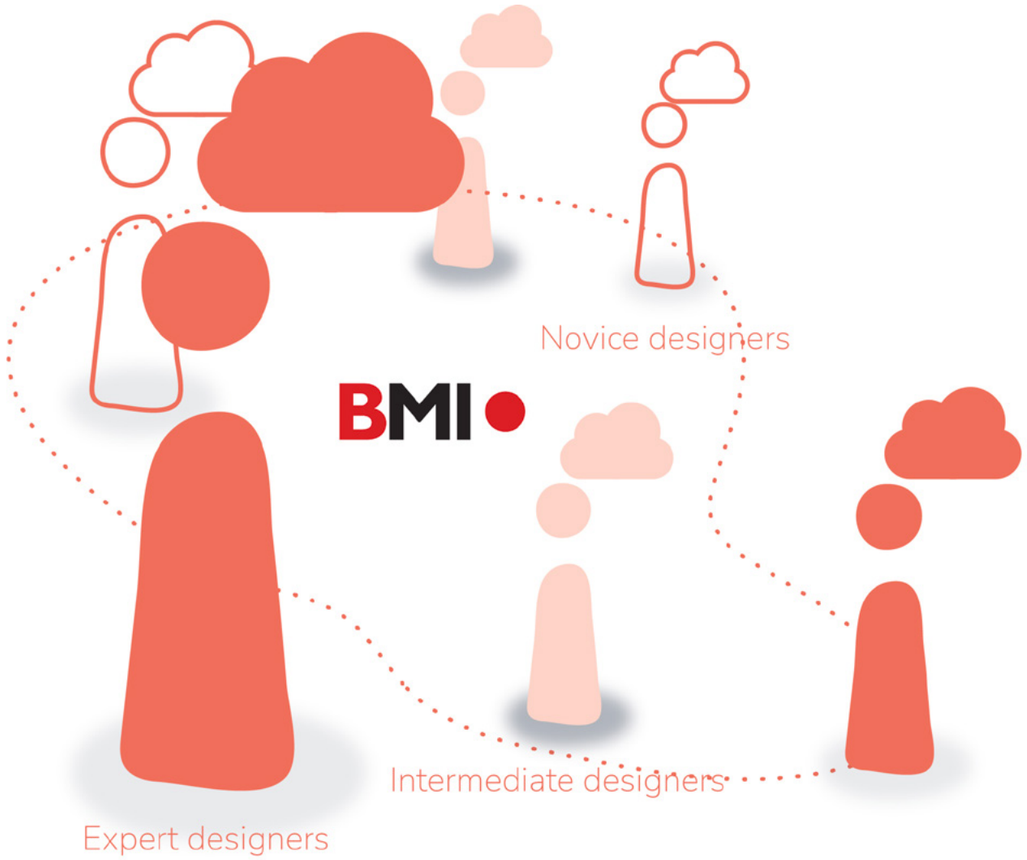


Figure 22: The knowledge gap between novice and expert (and intermediate) designers is highly caused by the limitations of the current database. The information and knowledge from teammates is not easily accessible unless you are the creator and know where to look at

To answer the questions this chapter started with:

What does the design process of an 'accelerator' project look like?
The accelerator project uses the double loop design method. The modus operandi of the BDers in this type of projects is divided by two main roles: content creator (e.g. finding information, filling in canvases) and facilitator (helping the client think of innovative business models). The client takes the role of the resource group, taking action as well during the meetings with the BD team.

How does data/information fuel the design process (double loop)?
Incoming data such as customer trends, pains and gains, the client's strategy and financial information, trend research on financial, technological, demographic and competitor developments or examples of other company's business models and their shifts must be first analyzed by the BDer. The analyzed data (information) becomes part of the content used in the 'understand' step, where the client is approached with the current situation of their business (closely-related stimuli). During the 'ideate' step, they are confronted with external stimuli that aim at being inspirational to them. The type of external stimuli is dependent on the level of innovation the client wants to achieve in the 'accelerator' project. The more daring and willing to reach radical innovation, the more distantly-related the external can be.
During the ideation session, when data becomes creative material for the generation of new business models, some techniques are used by BDers to facilitate the clients. These idea generation techniques are for instance 'brainstorming', 'freshwatching' or high-level inquiry.

What type of data/information is used by BDers?
Depending on the problem at hand, a BDer has to comprehend how relevant the information is for the context of the problem, as explained, depending on how innovative the outcome of the project must be.
The type of external stimuli most used during both sessions ('understand' and 'ideate') are a combination of visual and textual stimuli.

What are their current challenges with data usage?
There is large amounts of curated information in BMI's database and that could be used to inspire BDers and clients in the steps of 'understand' and 'ideate'. However, the biggest challenge with data at BMI is the way it is being stored, which causes data loss and difficult data retrieval and therefore, the team cannot build upon the content they have already created. This is especially limiting to novice BDers who struggle to find useful content for the 'understand' and 'ideate' steps with the clients and can easily become overwhelmed by the vast amounts of content available.

5. Key insights

Now that all three main elements of this project have been properly addressed, important conclusions and insights are drawn.

1

Most important insight

The initial research question and sub questions were extremely valid to the challenges BMI faces with the usage of data, but my research exposed an underlying problem. BMI has vast amounts of information gathered and created throughout the years that can add a lot of value as external stimuli to the phases of ‘understand’ and ‘ideate’. However, the current database hinders data retrieval and causes several challenges, which are mostly experienced by novice BDers.

From the research I executed in the field of data science, I realized that computational algorithms can bring added value to the design field, as they support less time-consuming search for stimuli that can be used for the design phases of ‘understand’ and ‘ideate’. Applying some strategies from the data science field could help solve the scalability issue of BMI as well as the research questions I started the Master thesis with

2

From the three creative sessions I carried out, I was able to conclude that the best form of stimuli for BDers and clients seemed to be a combination of pictorial and textual stimuli, such as the one presented in figure 20. Furthermore I understood which useful idea generation techniques are currently used at BMI: high-level inquiry, brainstorming and freshwatching

3

The selection of external stimuli for the steps of ‘understand’ and ‘ideate’ is highly dependent on the level of innovation the co-creation team wants to achieve during an ‘accelerator’ project. The three horizon innovation terms proposed by McKinsey and internally defined at BMI as within planet Earth, to the moon and towards Mars, greatly define how ‘near’ (closely-related) or ‘far’ (distantly-related) the stimuli should be during these sessions

6. Chosen design direction

This chapter explains which design direction was chosen after understanding what the context of the problem was. There are three main elements to this chapter: the problem statement, the design challenge and the design criteria. Choosing a design direction facilitated the decision making and idea generation in this project.
The following questions are answered:

What was the problem given in the initial design brief?

How was the 'problem as given' transformed based on the executed research?

What was the design challenge I decided to tackle?

What are the design criteria I determined for the project?

6. 1. Problem statement

For the explanation of the problem statement, it is required to explain two design concepts: 'problem as given' (PaG) and 'problem as perceived' (PaP). According to Heijne and van der Meer (2019), it can occasionally happen that the problem must be restated if the problem as first described (given) did not phrase the correct challenge. In the scope of this Master thesis, the PaG was constructed by the research question and sub questions, which were the following:

RQ:
How could designers make use of data to drive their creative process and unlock unforeseen connections and possibilities?

sub RQ1:
Which kind of data can be used, in which step(s) of BMI's design process can it be implemented and how can it fuel the design process?

sub RQ2:
Is there a way to efficiently gather and (re)use data?

From the research and understanding gathered in the first iteration of this project, it was concluded that this research question was equally valid to the case of BMI. However, an underlying problem was found, which had to deal with the scalability of the design tasks at BMI. The organization faces an imminent challenge regarding data. Their pre-existing content (either gathered or created) after each project is saved in a database that hinders seamless data sharing and retrieval.

The framing of the PaG to solve did not change, but did face the introduction of the current challenges with data within BMI. This is how the student phrased the PaP:

Up to now, BMI has experienced a limited scalability to their business activities. One of the main reasons for it has been not leveraging data's full potential within the organization, which has the following consequences:

i) do double amount of work (especially 'understand' phase)
ii) do not leverage their 'understand' information throughout the rest of double loop
iii) miss out links to data in client projects
iv) are limited in creativity because the same data/content is used repeatedly

6. 2. Design Challenge

The design challenge was defined, therefore, as:

This could be tackled by using the already-created content as an external stimulus to drive the 'ideate' phase, as well as creating a structuring strategy to BMI's data consumption

6. 3. Design criteria

Now that the problem statement and design challenge have been recognized and understood, setting expectation parameters for the solution is essential. The Design Criteria canvas from BMI was used for this step, which gathers the most important points from the Value Proposition canvas (figure 23) and Problem Radar canvas (figure 24). These canvases were based on the research (own and desk research) from the previous chapters, and supported the creation of the design criteria. The main goal of the criteria was to help the convergence phase of ideation, in order to comply to the main pain points and challenges explored. The main points from the canvas (figure 25) are the following:

The concept must:
i) serve as external stimuli, inspiration to clients and the BD team,
ii) leverage the potential of the previously-generated data and wisdom within the organization and,
iii) allow the design process to be explicitly driven by data, so that links throughout 'understand' and 'ideate' are not lost

The concept should:
i) allow clients to observe the raw data throughout the 'accelerator' program
ii) reduce amount of double work in the 'understand' step

The concept could:
i) be a digital tool
ii) prove there's potential in a data-driven BMI, in at least one step of the double loop process

The concept won't:
i) create new canvases for BMI
ii) make the 'accelerator' offering obsolete, but would rather be an addition to it

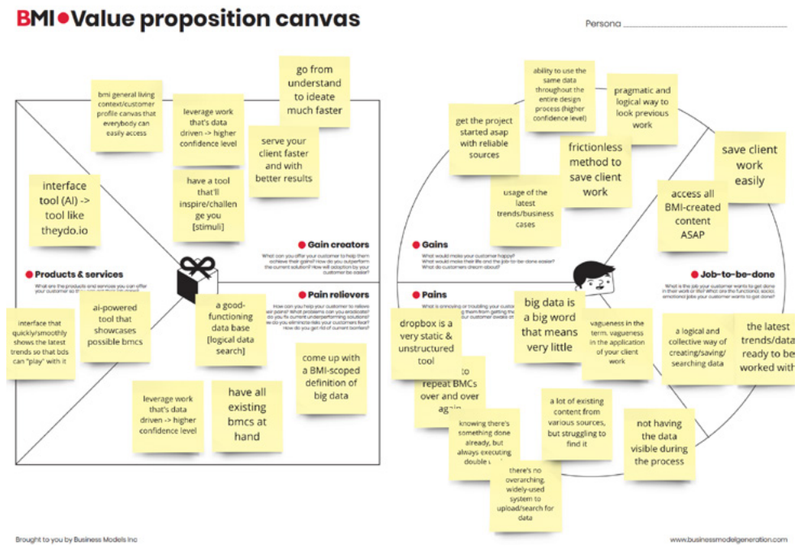


Figure 23: Value Proposition Canvas for BDer that I used

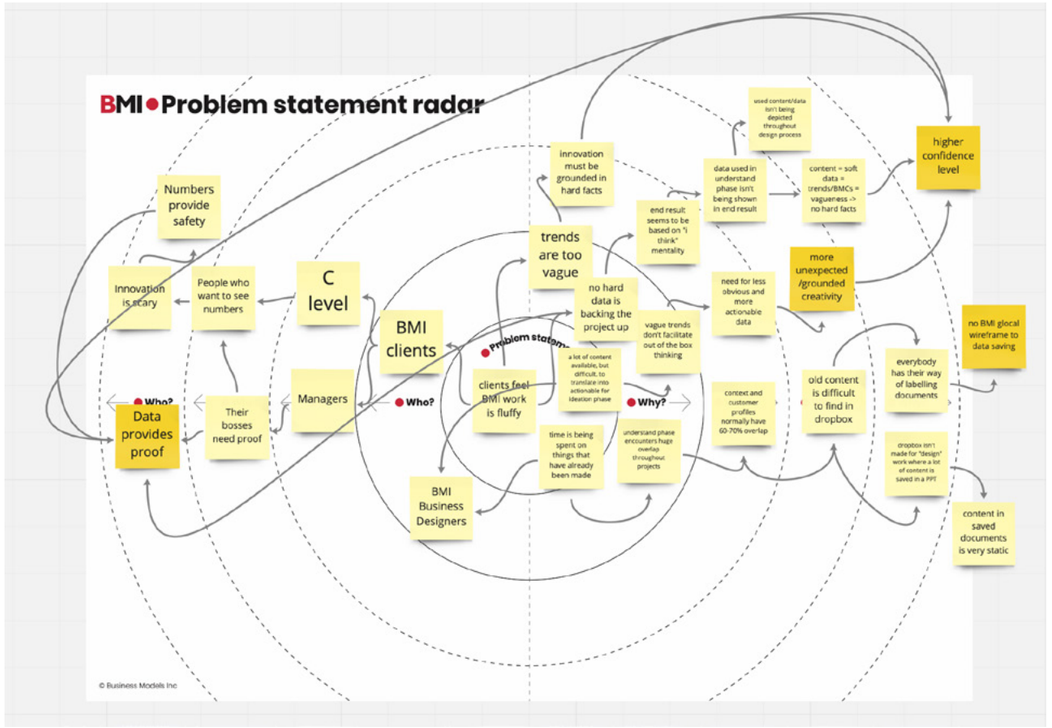


Figure 24: Problem statement radar canvas for BDers that I used

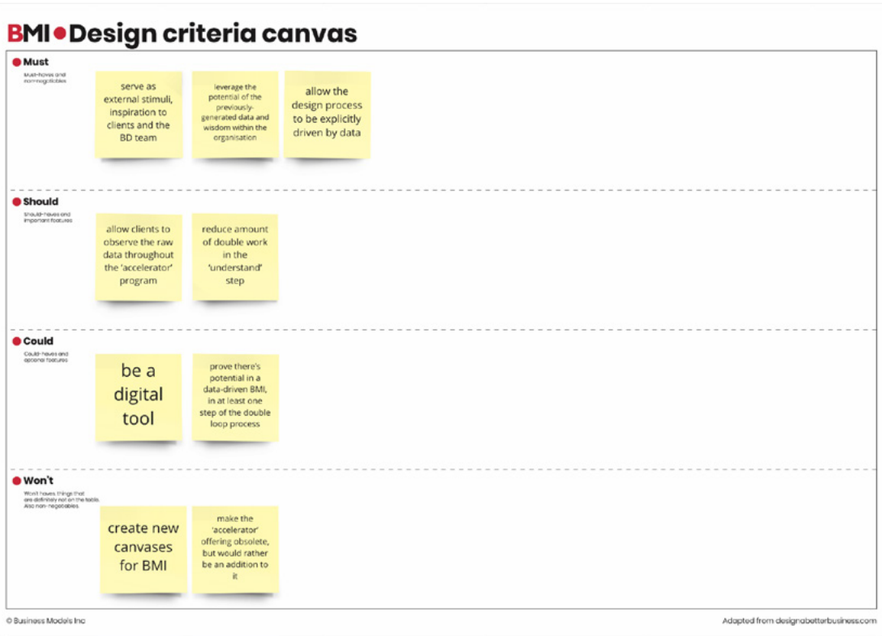


Figure 25: Design criteria canvas that I used to drive and help convergence during ideation

7. The concept: BM AI

BM AI is the concept I developed and that aims at solving the scalability challenges within BMI, which hinder the creative value of the already-generated content. BM AI explores what the organization would be able to achieve in regards to idea generation once a database would have been built.
This chapter is therefore tackling the following questions:

What was the ideation process behind the concept?

What is the name of the concept?

What are the different elements to it?

Which pains and challenges is this concept resolving?

How do BDers and clients interact with the tools?

How was the concept validated?

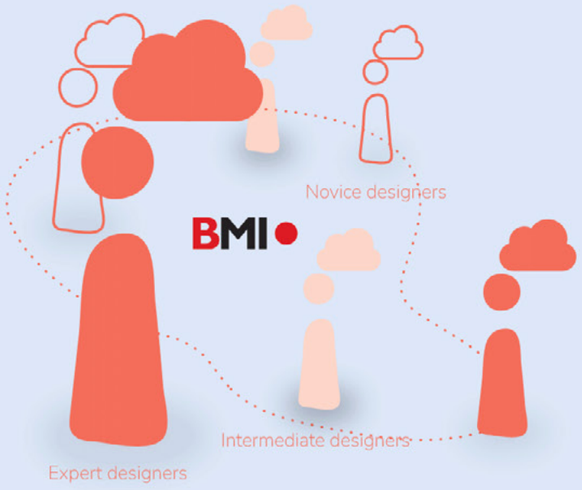
How is this concept to be implemented at BMI?

BM AI

Unfolding data's full potential in strategic consultancies through digital transformation

Start of a new 'accelerator' project

Challenge this horizon solves:
There is a lot of already-created wisdom at BMI, but it is currently not structured and stored in a way that allows frictionless data sharing. This results in a large gap of knowledge, specially among novice versus expert designers, which limits its scalability

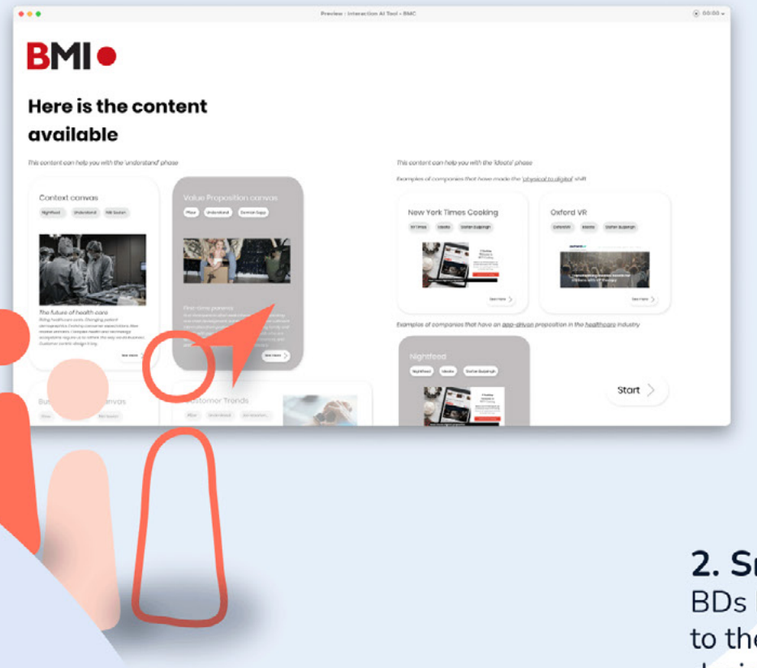


1. From manual to digital

Data structuring strategy to facilitate retrieval of useful content for design process within the organisation

Gather useful content for 'understand' and 'ideate'

Challenge this horizon solves:
Even though there is currently a large amouont of already-created wisdom, it is not easily accessible, mainly because it is a maze of content. BDs (specially novice designers) would rather search online every time a project starts than try to look in the BMI's current database. This is quite challenging and unefficient in the world of consultancies, where tight deadlines are given



2. Smart digitalisation

BDs have smooth accessibility to the already-created wisdom for the design steps of 'understand' and 'ideate'. This horizon depicts the ideal database interface that enables all BDs an easy search for useful content

Online isnpiration tool for 'ideation'

Challenge this horizon solves:
The already-created wisdom (case studies of existing business models) is not fulled exploited in the ideation process, which is mainly executed by the client (resource group)

3. Onto automation

Allow customers to utilise BMI's wisdom to spark their creativity and ideate new business models through an online tool

Figure 26: BM AI, my proposed strategy to tackle the challenges discovered during this Master thesis at BMI

8. 1. Introduction

BM AI is the proposed strategy for BMI to transform their business from physical to digital and unfold the potential of their information in their design process. This digital transformation requires additional technical steps to be implemented in their current way of working and hence cannot happen directly. BM AI is therefore a three-horizon roadmap where their starting capabilities and challenges are taken into account and allows the organization to drive a digital transformation.
BM AI entails the following three roadmap horizons (figure 26):

i) From manual to digital
ii) Smart digitalization
iii) Onto automation

The first horizon (from manual to digital) is a data catalog strategy for BMI to collect and store data consistently within the team and avoid data loss. This horizon gives an initial response to the necessary challenge of BMI's scalability.
The second horizon (smart digitalization) starts from the premise that a database has been built with the data catalog presented in the previous horizon. This horizon has the BD team at its main core for problem solving and proposes an interface for the database so that BDers can easily access the content that is being created at BMI for the steps of 'understand' and 'ideate'.
The third horizon (onto automation) exposes what BMI could do with the content being created within the organization to inspire business model ideation with a data-driven tool.
To watch the explanatory video, click here: https://youtu.be/zUrqH5n8fuU

BM AI is a strategy that in fact solves the PaG of this Master thesis (research questions and sub questions) and the PaP in the organization (observed challenges at BMI). This is done through the application of some techniques belonging to the field of data science. Computational design tools, which, as explained by (Gonçalves et al., 2016) support a less time-consuming search for stimuli in the different phases of the design process and that have different levels of distance to the context of the problem at hand. These computational design tools possess properties of machine learning, as they provide recommendations based on the data they are trained with.

8. 1. 1. Elaborate ideation

One of the most challenging things of writing this report is to tell a cohesive story when a lot of design iterations happened in a very short time. This Master thesis was everything but a 'waterfall' project. The ideation of this concept started already in my 2nd design iteration, where I had already observed that letting the information gathered by BMI be accessible to all teammates would be an interesting start. That is how I created the wireframe for a data search engine (figure 27). Figure 28 also showcases some of the ideas I had along the way. Some of them were for instance and AI-driven tool that would drive idea generation in clients by creating inflection moments in them through storytelling.

The three creative sessions (Appendix D) I carried out in the 2nd design iteration were also a way of ideation. During these sessions I already wanted to test the external stimuli I gave the BDers and the interaction they would have with it to drive the generation of business models.

Executing the creative sessions did not necessarily bring answers to the all the questions I had, but allowed me to scope down the project as my focus was still too broad.
Two days after doing the creative sessions I created the MVP for the tool of horizon 3, which was already part of my 3rd design iteration (https://youtu.be/l1-jlv4Yn6A)
The MVP of the tool was a 3-page Adobe XD prototype which captured the essence of what the actual tool for horizon 3 has become.

My 3rd design iteration started with creating a data structure strategy that was crucial to deliver to BMI as this was their most urgent challenge (horizon 1). That is why I prototyped with one of the tools being used at BMI, Batterii (figures 28 and 29) and that helped me understand better which keywords BDers would search for, based on what the data researchers already had created in the platform. I then built a starting version of a customized data catalog for BMI (https://youtu.be/jBI1iUY-eHk)
During this 3rd design iteration I also created a second and improved version of the horizon 3 tool (https://youtu.be/q-vl-n2rl6U) and a first version of the horizon 2 tool (https://www.youtube.com/watch?v=10PnzJ3tRQg&feature=youtu.be)

All these prototypes I have just mentioned were also validated, as it can be seen in the methodology chapter (figure 3). This means that the concept that is being shown in this chapter is a highly validated concept, with three different and tangible deliverables (one for each horizon); something that is quite unique for a SPD Master thesis. The chapter is divided into the three different horizons, the final prototyping/appearance, its final validation and further research and recommendations for BMI.

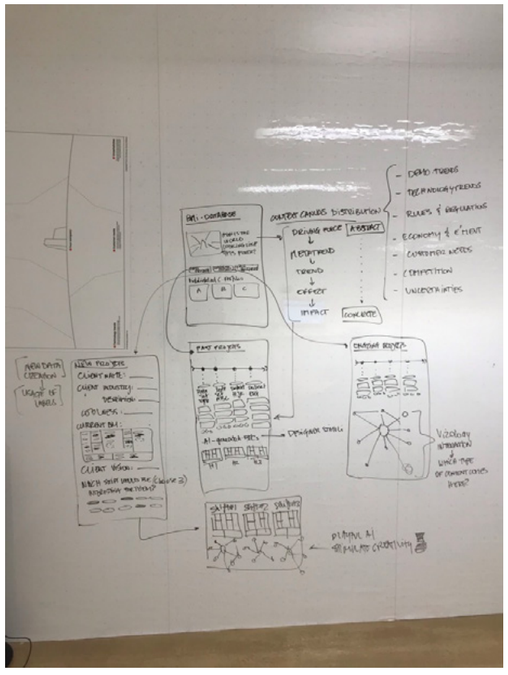


Figure 27: Wireframe of a search engine I created in the 2nd design iteration (end of October 2020)

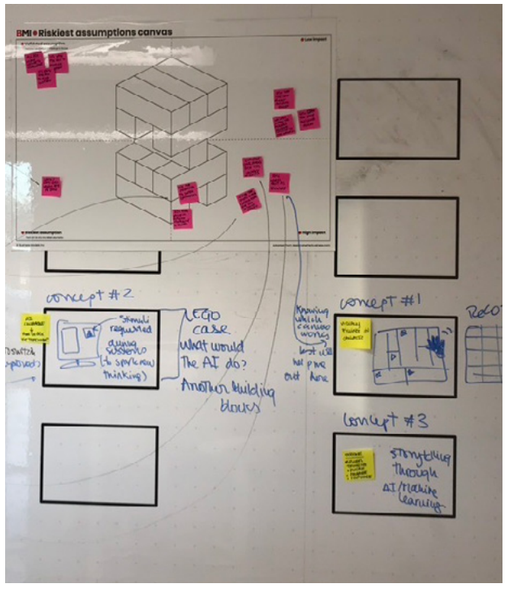


Figure 28: Random ideas I had during the end of the 2nd design iteration (end of November 2020)

8. 2. From manual to digital

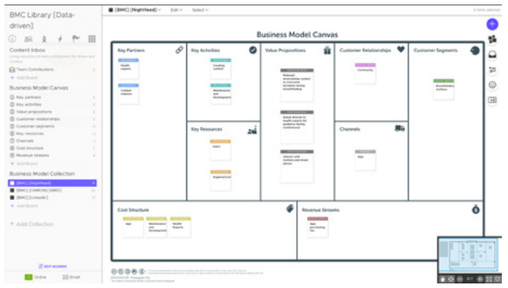


Figure 28: BMC split in cells (Batterii prototype) that I used to understand the most useful keywords the data researchers already used

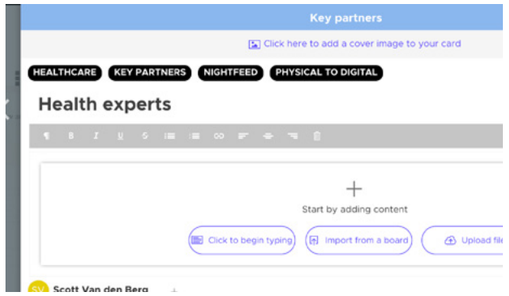


Figure 29: Key partners card with respective keywords/tags (Batterii prototype)

The main challenge BMI has with data has a great deal to do with the way it is currently stored. The BD team (especially novice designers) struggle to find information when starting a project. This leads to executing double amounts of work especially in the 'understand' phase of the double loop and limited creativity because the same stimuli are used repeatedly. This is all a consequence of the current database that the organization is using at the moment.
Dropbox allows data storage, but unfortunately the retrieval of data is quite challenging: if the BDer who is looking for the information is not the creator, they would have a hard time finding it as there is not a general data structuring technique.
Only the end deliverables can be retrieved, but 1) every team member has their own individual way to store and name the data which makes it extremely challenging to find again and 2) the information they used during the project (original articles, trends, examples of companies' business models) is now part of the final report and outcome, making it difficult to know which external stimuli worked well.

During an interview with a data scientist, the student was introduced to the concept of a 'data catalog' which 'informs customers about available data sets and metadata around a topic and assists users in locating it quickly' (Knight, 2017) (IBM Cloud Education, 2020). By using keywords to define the datasets, data scientists can easily retrieve data and reuse for other projects. This concept aligned perfectly with the challenges the 'data customers' (BD team) struggled with: retrieving information from the database.

The goal of this first horizon is to allow the content that BMI has created already to become digital, and respectively create a data catalog that would help the BD team know how to store data and consequently, retrieve it afterward.
The content of the data catalog was gathered while having internal interviews with the BD team, the two data researchers of the team and the my observations. Normally, the data researchers receive questions from the team (on platforms such as Whatsapp or Microsoft Teams) such as

'What is an example of a large organization in the healthcare industry in Germany that has recently introduced block chain in their business model?'
or
'Do we have an example of startup that has recently made a circular shift?'

With this type of question the researchers start exploring for information, but both of them indicated searching rather online than trying first with the BMI database.
The manner in which BDers would ask for information hinted at how they would ideally want to look for the stimuli themselves, which was explored in Data acquisition (4. 6. 2.).

The BMI data catalog serves as groundwork for the organization to understand which attributes and filters are mostly in demand. The purpose of this first horizon is to let the company and a potential data building strategic partner know how its database should be built. I also created a set of examples to the different values that the keywords may contain (Appendix G).

8. 2. 1. Prototyping of horizon 1

From the types of questions that the BD team normally poses I created this data catalog structure (figure 30), composed by the following keywords:

i) Client name
ii) Project name
iii) Region + country
iv) Industry
v) Business Model Shift
vi) Key terms
vii) Canvas

8. 2. 2. Validation of horizon 1

This final version of horizon 1 was validated with the two data researchers, three BDers, the account manager from Batterii and a data expert outside of the organization. They were shown the data catalog and were explained the logic behind it. From these interviews I was able to create some recommendations for further research for BMI.

8. 2. 3. Final recommendations and further exploration of horizon 1

Learnings from the Batterii prototype
The Batterii prototype (figures 28 and 29) helped me come to several conclusions. Batterii, although being a great tool for AI-analysed customer research, has some limitations as a database.
The data created in one project room (or database) is not linked to another. This means that if, for instance, a BMC is copy-pasted from the 'Raw Data' project room to the '[Name of client]' project room the link will be lost, causing a large data loss. If then a card/

asset would be updated in the '[Name of client 2]' project room it would not be automatically updated in the 'Raw Data' project room. Furthermore, splitting a BMC in all its nine separate elements would cause an immense data overflow. Already, with only one client project the student had gathered 80 cards within one project, which meant that the data search page became already overwhelming to look at. These two limitations have greatly to do with how the tool showcases data, but this gave the following insights to the student:
When searching for data, the tool must have ask the BDer for some initial filters to understand what they might ideally be in need for
The account manager of Batterii for BMI is always quick with responding and keen to hear feedback for the tool. Batterii might not be the ideal database partner for BMI at the moment, but with some fundamented feedback, it could become it.

As explained in Chapter 3. 4. 1, computer algorithms can be either supervised or unsupervised. In the case of BMI, the role of the data researchers might shift from content creator to trainer of the computer. Some of their tasks may include observing new developments in the keywords, for instance: 'Are there new industries we do not have currently created in the database?'.

As indicated by the back-end developer I interviewed as external validation, the proposed data structure strategy is based on a hierarchical structure, where some attributes are overarching others. This structure allows the BD team to easily understand how the different attributes relate with one another. Furthermore, this hierarchical structure allows a potential back-end developer (either internal or external) to 'aggregate' or 'drill down' data.

The first horizon is now showcased in a hierarchical form. However, because sometimes the relations between the data attributes relate to one another differently, a 'network' visualisation of the data structure could also be interesting for BMI, such as force-directed graph (Bostock, 2017). This is a strategy also introduced by another company 'Vizologi' that offers analysed business models of companies in this network style of visualisation (figure 31).

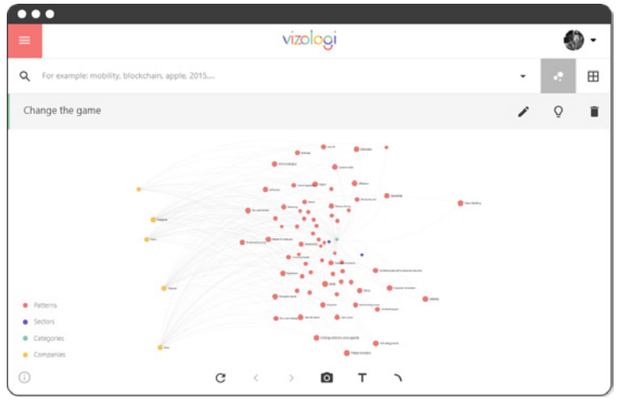


Figure 31: A network visualisation of data, used by the company Vizologi, which could potentially be useful as well for BMI (Vizologi, n.d.)

Attributes/Keywords for data structure

Example

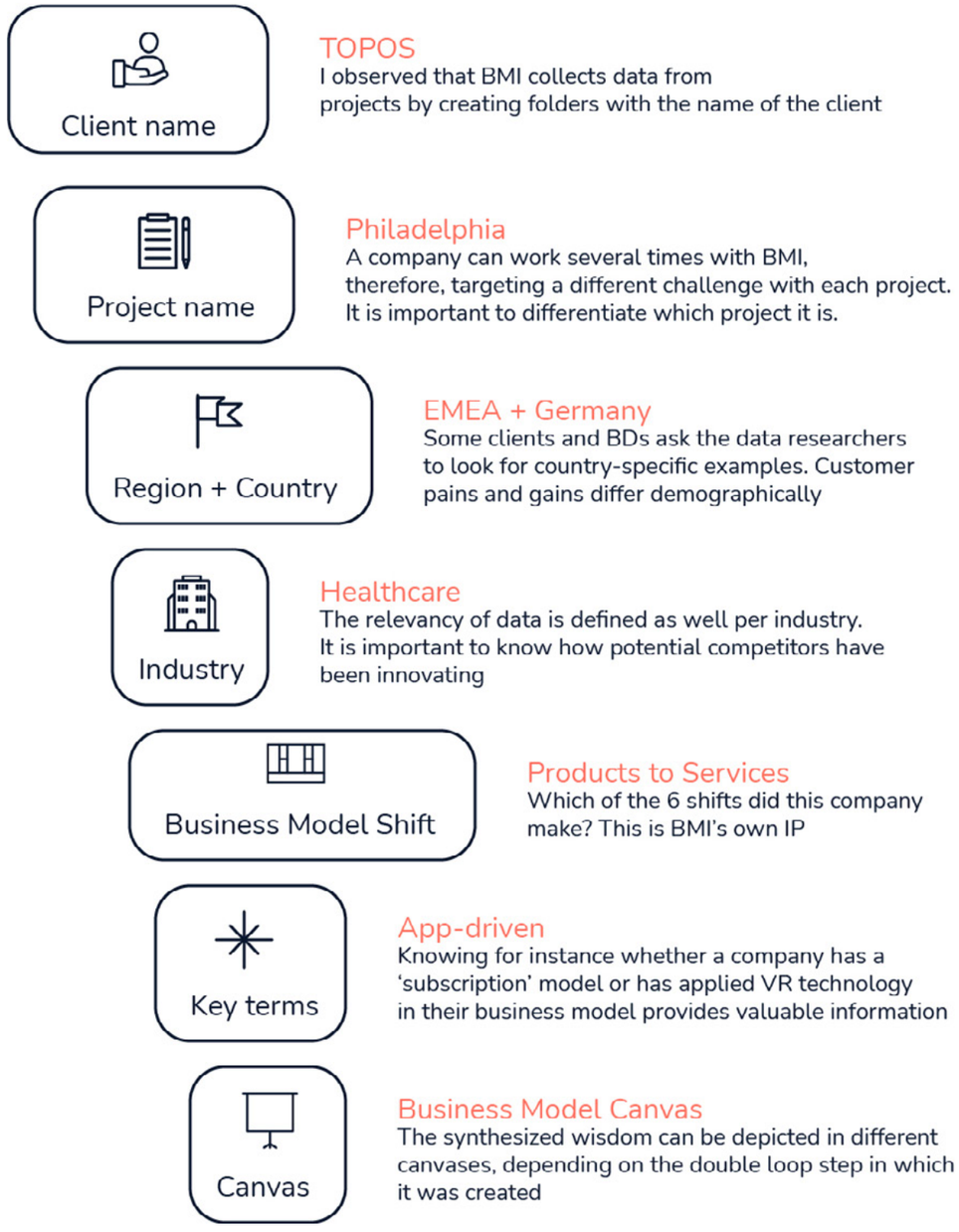


Figure 30: Proposed data catalog for BMI (horizon 1)

8. 3. Smart digitalization

The first horizon helped understand which keywords should determine the database structure of BMI. Now, the question is:
How can a BDer access the content as soon as possible and which type of external stimuli is most useful to get a project started and drive creativity during an ideation session?
Horizon 2 has taken a digital form that resembles a search engine, facilitating the process of stimuli search and selection for the BD team.
Based on the BD team's way of thinking and searching for data, I created a digital interface of how the database might have to look like.
The first page of the interaction, BDers can quickly run a search query, observe which projects are ongoing at the moment or start a new project themselves.
This allows the BDer not only to search for stimuli actively but also passively and randomly.

In case of starting a new project, the tool first inquires the BDer with some filters that can allow it to distill which content is more relevant to the needs to the project's outcome, depending on the type of external stimuli desired (either closely or distantly related). These filters, as you can see, are based on the keywords that were discovered and introduced in the data catalog of horizon 1 (figure 30) and which are also based on the findings from Chapter 4.

At the end of the filtering phase, the BDer will be able to click on the content available that might help her/him in getting the 'understand' and 'ideate' phases started with stimuli that might first, inspire her/him and second, the client.
The form of the presented stimuli is based on the outcomes of the creative sessions (Appendix D) in which I understood that the best showcase was a combination of pictorial and textual stimuli (figure 20). That is why the stimuli is being presented with a representative picture and a short description.

The information available in the tool is the sum of BMI's created content, including every BDer. Accessing valuable and relevant information from other colleagues becomes less challenging, especially for novice designers who can easily get overwhelmed. For them, the tool already reduces the unlimited possibilities they could potentially find in BMI's current database (Dropbox) by requesting some initial filtering. Before starting the project the BDer must select which stimuli she/he would actually want to work with.

8. 3. 1. Prototyping of horizon 2

This prototype was created in Adobe XD and not only works as an internal search engine, but helps BDers search for relevant content from the 'understand' phase to incorporate during the 'ideate' workshop with the client (figure 32). The final version of the tool can be found at https://youtu.be/3y1nLYbuhOM.

8. 3. 2. Validation of horizon 2

The last version of the tool for horizon 2 was validated through three interviews with BDers (1 expert, 1 intermediate and 1 novice) and a validation session with 4 novice BDers.
This last validation session is explained in detail in Appendix F. The session wanted to test whether the actual stimuli the search tool would provide the BDers might drive creativity. The session was targeted at the design meeting that takes place before and 'ideate' session where BDers meet and discuss which examples they would like to use to create inflection moments (or 'AHA moments') in the client. The desired outcome of the session was that the stimuli presented would allow the BD team to come up with more ideas (fluency) and more varied (flexibility) than when having no search engine.

However, the results were not as conclusive as desired. There was no control group because of time limitations and it was difficult to calculate the average amount of stimuli the team would gather during a design session without a search engine. At BMI, every project is completely different and some ideation sessions might have 4-5 external stimuli examples while others might have 50, depending on the needs of the client.
However, at the end of the session I planned 15 minutes of discussion where I posed the BDers some open questions and Likert scale questions.

i) The most ideal form of stimuli was a picture, a short title and a few sentences of description
ii) The tool did give the BDers inspirational and relevant content (average of 4 out of 5 in both cases)
iii) The stimuli presented for the 'understand' step had already been validated during the interviews prior and it was confirmed that the showcase of canvases (context, VP and BMC) was highly useful

8. 3. 3. Final recommendations and further exploration of horizon 2

Although after having carried out a validation session with 4 BDers, understanding whether this type of stimuli would drive the creativity of BDers more when preparing an ideation session is still a question mark. The results from the session were not conclusive and because of time constraints no additional session could be organized.

At the end of the session, the BDers had some suggestions for potential future work. The first one was to have a 'Bumble' interaction for the selection of stimuli. They said:

'it would be nice to have a gamification element'

Also, they pointed out that they would like to see a closer link between the interaction of the tool and the actual set up of an ideation session deck. Normally these decks start with the current context of the company, their current business model, the current customer segment, the vision, some 'freshwatching' examples and high-level trigger questions such as 'What if...?'. For instance one of the participants said:

'maybe need a flow/ metro map to navigate and make step by step decisions'

This horizon shows that there is enough information within the company and that the role of the data researcher might have to shift. Their responsibilities might become to collect the already-generated information, add the proper keywords and make sure that it is accessible to everybody. This would allow them to have much more time to focus on their important task (which is finding interesting case studies) and support them and the team with the retrieval of this already-generated information (which would save time for everybody). Therefore, it is interesting to investigate further which type of skills the data researchers may have to acquire.

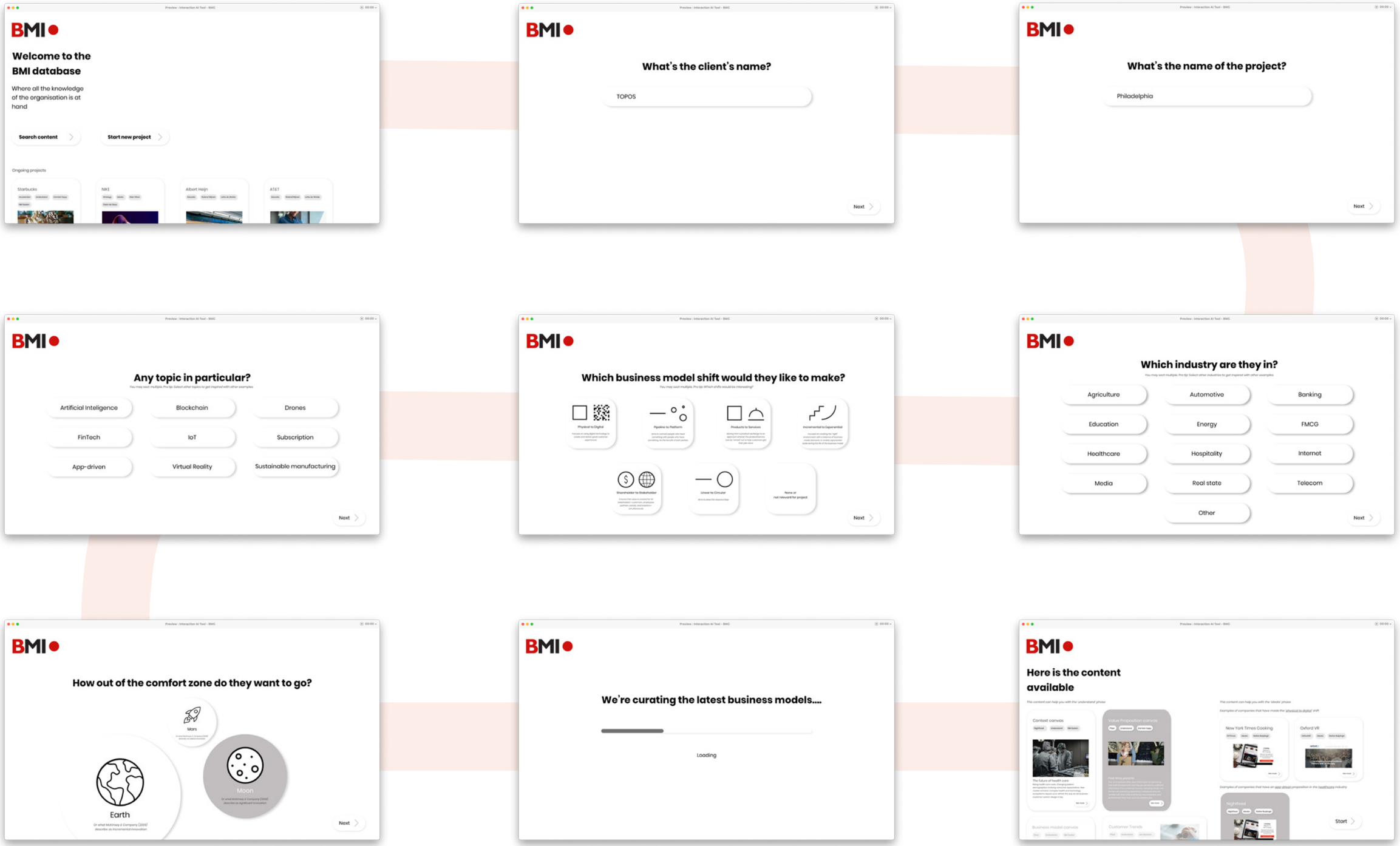


Figure 32: Screenshots of the prototype I built for the search engine of horizon 2

8. 4. Onto automation

The Business Model Innovation tool is the proposed tool for horizon 3.
The tool is meant to be used as an online touch point of BMI with its online 'fans'. These fans are students, entrepreneurs, potential clients that are interested in the curated content of BMI (BMCs of interesting companies) and that would like to explore and innovate their business model.

This tool allows these fans to access the highly curated information BMI has to offer and use it as a stand-alone element during an idea generation session. The use of this tool is therefore purely online and is meant to be solely used by the users themselves. BMI would therefore be tackling a new customer segment, skeptical at first to start a full project with BMI, but would first get a glimpse at how their business could innovate. I created a BMC for this new value proposition of BMI, which can be seen in Appendix I.

The tool uses the idea generation technique called 'freshwatching' (van der Pijl et al., 2016), which was introduced previously. This technique allows the client to take another company's business model (in the case of the prototype shown in Figure 33, that has made an interesting shift) and apply elements of it to their own. This technique allows the client to generate ideas in how they could capture value for their clients. The form of the stimuli is therefore a BMC that has pictorial and textual information and that allows for an interactive experience.

The reader is most probably able to see that the interfaces for horizon two and three have much in common, namely the filtering questions. Clients are able to retrieve content closely-related to their challenge at hand or distantly-related. Some clients may want to explore opportunities and select stimuli based on curiosity as opposed to only relevance.

This tool therefore facilitates the process of keyword finding (through aided filtering), stimuli search (based on selections made) and stimuli selection (the clients are namely given an interesting BMC), as well as idea generation. It also provides BMI with enhanced online marketing and visibility of the BMI brand.

8. 4. 1. Prototyping of horizon 3

The final outcome of this concept can be seen on https://youtu.be/BC51jzmQAgo. This tool is also an Adobe XD prototype (figure 33).

8. 4. 2. Validation of horizon 3

The desirability of this last version of the tool was validated through a video that was posted by the marketing department of BMI on their LinkedIn page. It was planned as a buy-in method, where clients/fans/followers of BMI (the target group) would be able to sign up for the first trials. To see the video, click here: https://youtu.be/mblP-XQhLBU

After a week of being online, I had a meeting with the head of the marketing department and we went through the Google analytics that came out of the experiment. The conversion funnel can be observed in figure 34. The post had 737 views on BMI's profile. 29 people actually clicked on the link that allowed them to sign up for the trials. The conversion rate of people that actually signed up to have access to the tool was 37,93%. Looking at the average conversion rates of BMI this post had a similar response than other posts, which reveals an acceptable result for the desirability. Furthermore, the domains of the email addresses received proved that the target group is indeed the fans of BMI and not potential clients (e.g. employees of large corporates).
There were also some offline positive reactions. An intermediate BDer shared the following text on Whatsapp:

'I just finished a session with a client and he asked me: could you give me access to this? It looks interesting!'

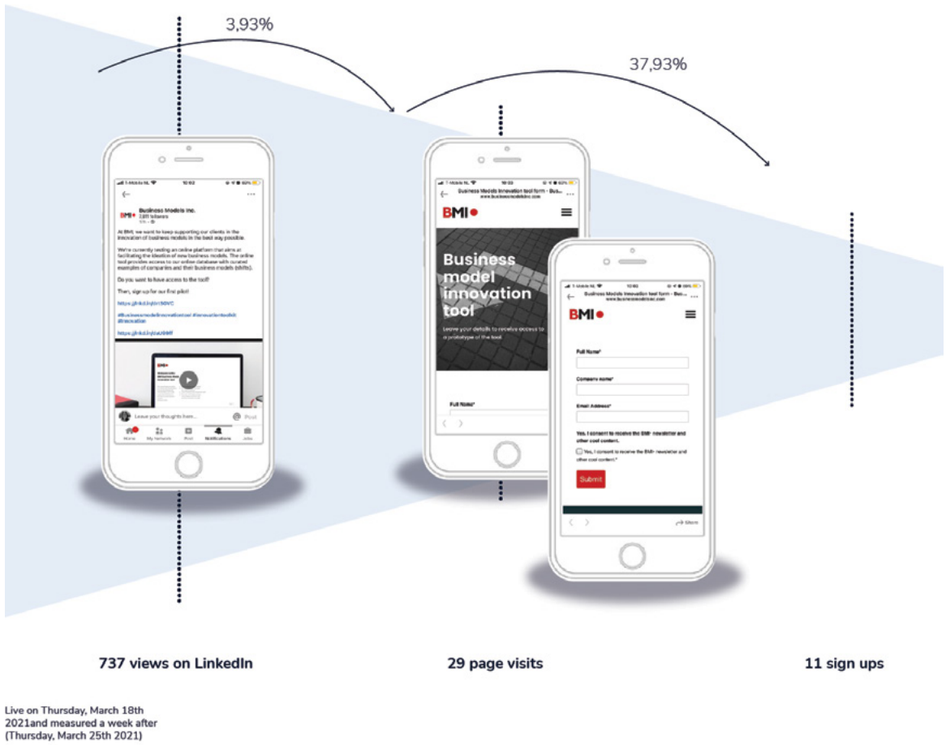
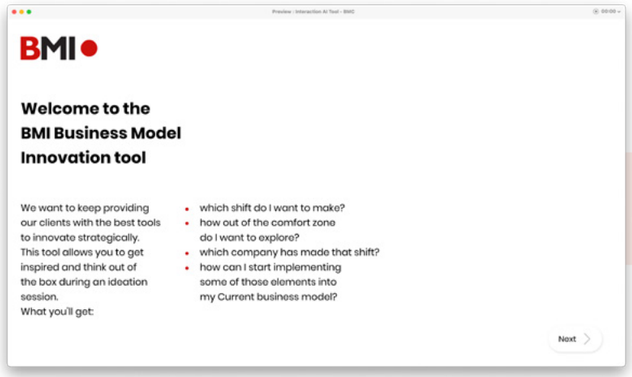


Figure 34: Validation of the Business Model Innovation tool and results after one week of being live on LinkedIn

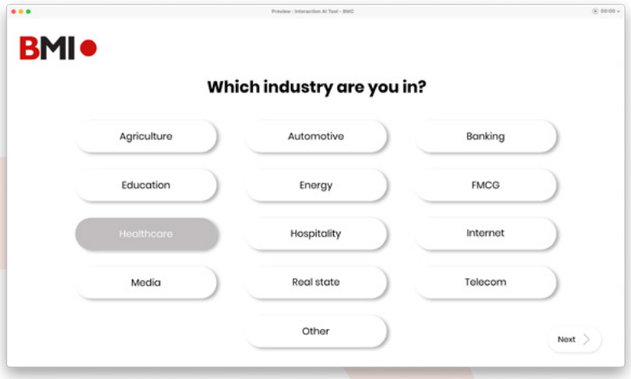
8. 4. 3. Final recommendations and further exploration of horizon 3

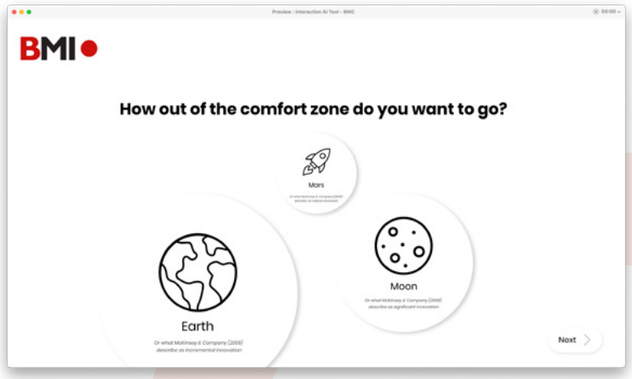
The technique of freshwatching and high-level inquiry is currently used at BMI. It would be interesting though to test whether the tool provides at least the same amount of creativity (fluency) than an ideation session as a control group.

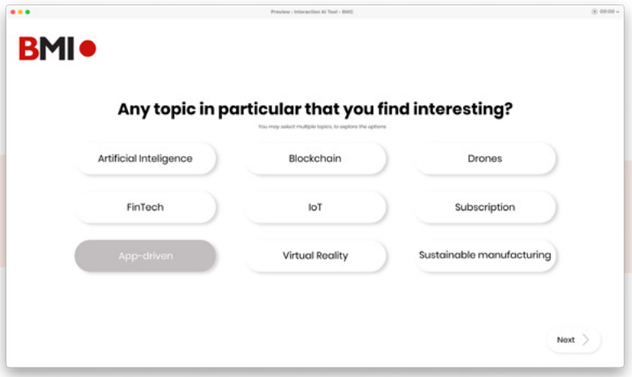
Also, the tool is currently meant to be used by one person at a time. What would happen when colleagues could co-create?
Could they ideate simultaneously in the interface of the tool? Could they share results

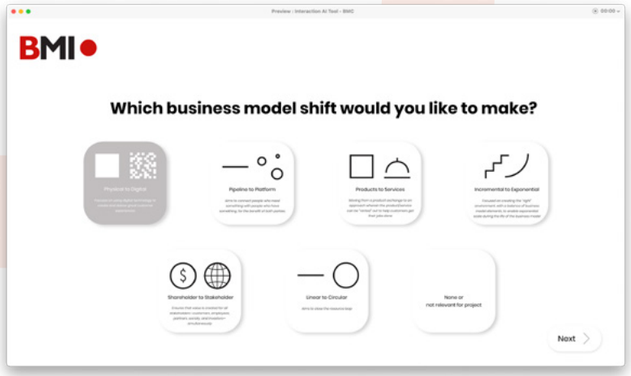

BMI
Welcome to the
BMI Business Model
Innovation tool
We want to keep providing our clients with the best tools to innovate strategically.
This tool allows you to get inspired and think out of the box during an ideation session.
What you'll get:
which shift do I want to make?
how out of the comfort zone do I want to explore?
which company has made that shift?
how can I start implementing some of those elements into my Current business model?
Next

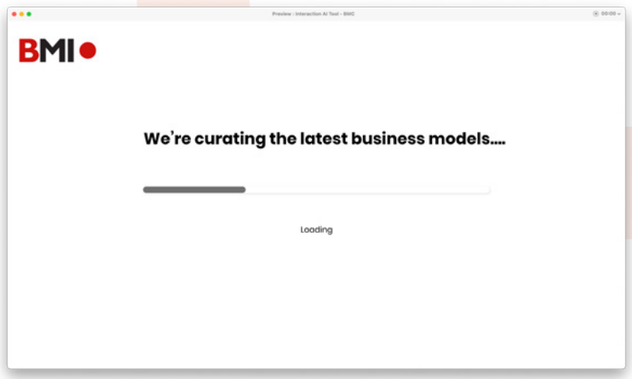

BMI
Hello there!
My name is Niki.
I am a business designer at Business Models Inc.
I will help you out today in the journey to create a business model that creates value for your customers!
Shall we get started?
Got me inspired!

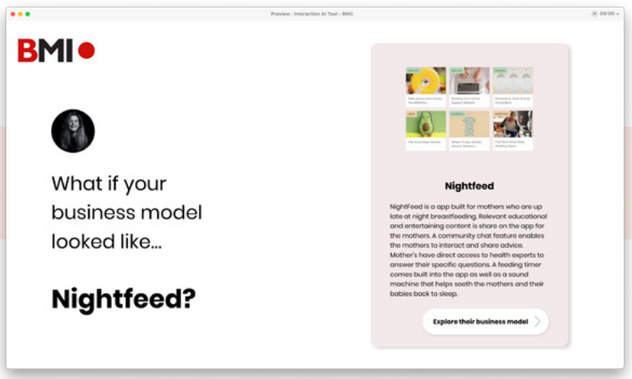

BMI
Which industry are you in?
Agriculture
Automotive
Banking
Education
Energy
FMCG
Healthcare
Hospitality
Internet
Media
Real state
Telecom
Other
Next


BMI
How out of the comfort zone do you want to go?
Mars
Moon
Earth
Next


BMI
Any topic in particular that you find interesting?
You may select multiple topics, to explore the options
Artificial Inteligence
Blockchain
Drones
FinTech
IoT
Subscription
App-driven
Virtual Reality
Sustainable manufacturing
Next


BMI
Which business model shift would you like to make?
Physical to Digital
Pipeline to Platform
Products to Services
Incremental to Exponential
Shareholder to Stakeholder
Linear to Circular
None or not relevant for project
Next


BMI
We're curating the latest business models....
Loading


BMI
What if your business model looked like...
Nightfeed?
Nightfeed
Nightfeed is a app built for mothers who are up late at night breastfeeding. Relevant educational and entertaining content is share on the app for the mothers. A community chat feature enables the mothers to interact and share advice.
Mother's have direct access to health experts to answer their specific questions. A feeding timer comes built into the app as well as a sound machine that helps sooth the mothers and their babies back to sleep.
Explore their business model

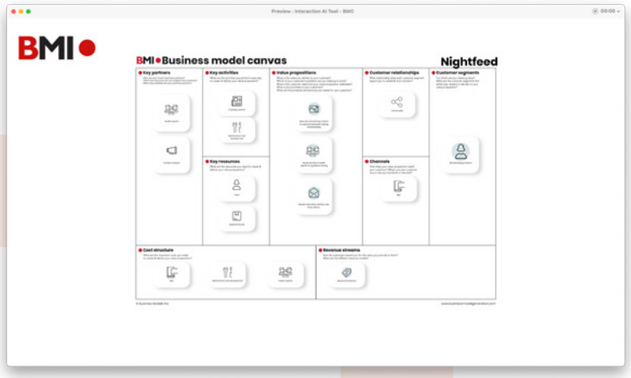

BMI
BMI Business model canvas
Nightfeed
Key partners
Key activities
Value propositions
Customer relationships
Customer segments
Key resources
Channels
Cost structure
Revenue streams

Figure 33: Screenshots of the prototype I built for the Business Model Innovation tool for horizon 3

with one another? Could they diverge and converge collectively?
Also a point of advice that came during one of the validation interviews with an intermediate BDer was to allow the client to first fill in their current business model canvas. This would also allow the computational algorithms to recognise patterns and retrieve relevant content. But also, because it would be a much more accurate representation of the ‘freshwatching’ technique, where the client’s current BMC is compared to the BMC of another.

This tool is meant to support divergence and come up with as many ideas as possible. But could the tool also help with the convergence? Maybe a similar ‘bumble’ interaction could be interesting to explore where the user first gets to swipe which options are interesting and then select the top 3 for each of the elements of the BMC.

The tool can result in several ways of value creation for BMI towards its clients.
The most accessible way would be to use the tool as a channel to reach out potential new clients. The premise would be that if somebody is using the online tool, they might be interested in business model innovation. This would help the BMI marketing team with the identification of individuals seeking to innovate their business model, which could result in another layer in the pipeline of client acquisition. There is potential to include, once the tool’s user is done with ideation, the contact of a BDer at BMI. This might lower the threshold to contact the BMI team and can therefore drive new client leads.
Another possibility would be to explore whether a ‘freemium’ BM or subscription BM would be desirable for the Business Model Innovation tool.

The other way to create value for BMI would involve a ‘freemium’ model. Spotify has smartly implemented this business model where users can access the content either for free (including advertisements and limits to their experience with the platform) or premium, where they pay monthly and have full access to the best experience available. BMI could apply the same business model and have a limited version that is accessible for free or provide the best experience to visitors by purchasing a monthly subscription.

8. Discussion and conclusions

8. 1. Contributions to strategic design

This Master thesis has shown the untouched potential data can have at Business Models Inc.
The starting point of the project was to understand whether data could drive the creative process and how that would potentially look like during ideation. Its potential, however, is closely linked to the way data is treated in design consultancies: so far highly manual work and data storage solutions, which hinders its scalability.
The field of data science, as this project has introduced, provides a smarter strategy to structure and store data.
Therefore allowing the organization's created content to flourish and allow its designers to have access to remarkable content that will allow them to 1) avoid doing double the amount of work and 2) be stimulated by content they had not originally thought of.

The thesis proposes a 3-horizon strategy in which the organization's ideal data structure strategy, how this would take form and support the internal BD team and how the already-generated content can serve as external stimuli during ideation sessions for clients are presented.

Although, this Master thesis and its outcome present a blueprint to achieve a digital transformation at BMI, a similar approach can easily be extrapolated to the design consultancy field (as seen during the interviews with other consultancies, where data remains presenting a challenge to them)

In strategic design projects, a lot of content is gathered. Design teams constantly update and increase their knowledge on feasibility, desirability and viability. It is a common phenomenon that a large knowledge gap takes place between novice and expert designers because of how data saving is approached in the design field, which reduces the scalability of the strategic consultancy practices and business.

This Master thesis has 1) shown how embracing elements and attitudes from data science can highly benefit the strategic design field. These practices can ensure that data is not lost and that all team members have seamless access to the same up to date content 2) has showcased how with the smart use of a data catalog strategy all designers in a team can reduce their design fixation by smartly being exposed to relevant and inspirational content through a search tool and 3) the Business Model Innovation tool has applied a smart approach to the brainstorming technique of 'freshwatching' and has delivered its digital counterpart. This final horizon showcases how a strategic consultancy who strongly focuses on 'viability' and 'desirability' can exploit its already-existing content through a digital approach, inspiring their potential online users.

This Master thesis brings therefore rationale and foundation to the ideation of new business models, by portraying explicit content in an interactive manner.

8. 2. Contributions to company

In a time where data sharing has never been as accessible as important, the design field is still not utilizing the possibilities of it to the fullest extent, having as consequence data loss in teams and forcing designers to gain knowledge solely through their own experience. Data should therefore be stored and structured according to the organization's needs. This master thesis has provided the company with a blueprint into how a digital transformation can be achieved.

The Master thesis has proved that data regarding desirability and viability (either quantitative or qualitative) can and should be used in the strategic design process. Concretely, for BMI, this type of data can greatly benefit their design process (so-called 'double loop') in the phases of 'understand' and 'ideate', which are typically reused in projects.

The first horizon exposes a tailored data catalog strategy which ensures that data that is created is not lost in the current databases.

The second horizon ensures that all BDers can access the same data, specially benefiting novice designers, who explained being more comfortable starting a new project and searching online than going through BMI's previous work. Moreover, even for expert designers the second horizon allows for unexpected inspiration. Rather than being fixated with content relevant for that project (e.g. healthcare industry), one can get inspired by innovations in other industries such as FMCG.

Furthermore, the last horizon and its solution (the Business Model Innovation Tool) has been validated and its insights showed that clients are interested in its value proposition. The tool not only gives relevant information, such as the existing platforms 'Trendwatching' and 'Vizologi', but it provides the client with a hands-on experience. Clients can access relevant information which they ideate with and create new business models. This is a clear competitive advantage from other design consultancy for strategy and innovation, which is visually explained in Appendix I, as a BMC for a data-driven BMI.

8. 2. 1. Recommendations

The need to keep innovating internally and exploit the power of data at BMI has clearly been recognized. The new head of 'data/ digital' was appointed right before the Christmas vacation, which shows BMI is taking its digital transformation seriously.
As repeated by several colleagues at BMI,

'one of the biggest factors to a faster digital transformation is the organization's culture'

which has to be prepared to embrace a technological change, which may be new to their current core capabilities.

BM AI and its digital transformation require either an external party to pick up this project or new colleagues specialized in the field of data science and back-end development. As indicated by the data scientist and back-end developer interviewed during the validation of the first horizon, the decision of who should execute this digital transformation is dependent on two main factors: time and

money. Including an external data partner (such as Schuberg Philis) might result in a costly investment but can reduce the timeline and ensure quality.

Microsoft Azure is a known cloud computing service which would be a ‘diy’ solution. Less costly, it would require new colleagues joining the team who are experienced in back-end development. The added advantage is that the database could be built according to BMI’s needs, as opposed to a more standard package given by a potential data partner. Schuberg Philis, a party I interviewed in my second design iteration, has already worked with BMI for a previous project and might be aware already of BMI’s capabilities and needs.

There’s an increasing trend in the world of design in regards to the introduction of big data and data scientists (Minah, n.d.) in design teams. Design consultancies have already started introducing data scientists to their teams, ensuring that multidisciplinary teams are formed. The theme of big data and data science, as I concluded from my first design iteration, is currently out of the scope of the BD team and their core capabilities. However, it may be interesting to discover what including data scientists in the BD team can result in.

8. 3. Limitations

The Master thesis began with the hypothesis of implementing big data in the design practice of BMI. After executing the first design iteration, it was understood that big data implementation in the design field is not widely known but definitely something that is already happening. However, for the business focus and capabilities of BMI as a design agency, the implementation of big data unfortunately comes with several limitations that are difficult to avoid. This was a limitation to the starting point of this Master thesis and hence the shift from big data to the combination of qualitative and quantitative data that is currently used at BMI.

The BM AI strategy is mainly focused on the ‘understand’ and ‘ideate’ steps of the double loop. Therefore, it is expected that a more extensive data catalog and search engine would have to be designed.

Because of the stronger measures in The Netherlands that were taken during the completion of this project, the student was not able to test the tool (horizon 3) with a client. An ‘ideate’ session had been planned, where there would be a control group and a group stimulated with the tool. The goal was to observe whether the tool supported the latter team to diverge more in the creativity than the first team. I was able to validate the desirability of the tool regardless, with the creation of a short video that was shared in the social media channels of BMI and the functionality of the tool from horizon two through a validation session with 4 novice BDers.

8. 4. Further research

Accessing third-party and useful big data was a challenge for the case of BMI, where I recognised open source big data would be the most viable type of data accessible to them. Although big data implementation was a limitation for BMI as a design consultancy, it would be interesting to discover how it can be implemented in the design process at large corporations that have a high consumer-centric big data (e.g. Nielsen for Unilever). These organisations consume large percentages of their budgets in data acquisition and have therefore all the resources available for creation of new business models and value propositions.

Moreover, I developed a data processing wireframe which was composed of six steps (relevant data identification, data acquisition, data analysis, data visualisation, data implementation in ideation, data implementation in prototype and validate), which is suitable for the type of data currently used at BMI. It would be interesting to apply this wireframe to big data within BMI, which is already what I aimed at during the Master thesis. Appendix C gives a more detailed overview on the steps, the tools and content of this wireframe, which would serve as a starting point for BMI in regards to big data usage in their design process.

From the three creative sessions that were performed with three BDers, there was one insight that intrigued me a lot. As both Lu (2020) indicated, working with (big) data is highly challenging for novice designers, which is also what the student perceived during these sessions. The mid-level designer that concluded the co-creation session seemed to have a well-balanced way of working with data, while the expert designer scarcely looked at the data given during the session, which was previously observed by (Gonçalves et al., 2016) and defined as ‘inspiration avoiders’. This phenomenon can lead to the research question: ‘How can data-driven design be made for expert designers, so they are still open to rely on other sources other than their tacit knowledge and wisdom?’

8. 5. Reflection on project

I would like to start the reflection of my Master thesis by saying that I am first and foremost proud of myself; for achieving my learning goals and ambitions and in my eyes, going even further than what I had forecasted. Executing a project while a whole pandemic is taking place in the world was definitely challenging. Not only because it stops you from living life the way you were used to, but because it makes you wonder whether the people you love are safe.
Furthermore, it exposes you to the biggest thread: the virus, which I also contracted myself and left me useless for two entire weeks. Despite this drama, my planning barely suffered from it, which was largely thanks to the two planned buffer weeks I had. Although this was not a proper learning goal of mine, I must say, I feel extremely proud of myself for pulling myself up and facing these added challenges.

Recalling what the learning goals were from my stakeholder map introduction and analysis (chapter 2), I wanted to 1) try to make data a playable and visually attractive element (a creative material) designers could use to drive idea generation; 2) apply an agile methodology in order to assure I would reach a higher level of creativity and faster decision-making and 3) maintain a healthy work-life balance.
Next to these three learning goals (which I will explore and reflect on in detail), I also want to reflect on my final deliverables and the collaboration with both my BMI and TUDelft team.

The ambition behind the first learning goal was highly influenced by my dual personality: creative but fact-driven. I always believed data had the power to drive creativity while providing it with the 'I know' mentality.
This learning goal, however, became quite tricky and complex because BMI, as a strategic consultancy, had underlying challenges with data which I wasn't aware of at first.
Not only did I execute desk research on the topic of (big) data but I also thoroughly researched and explored internally what (big) data meant at BMI and what the current problems with it were.
Some of the actions I took were 1) semi-structured interviews with experts in the field of (big) data, data science, back end development, other strategic consultancies and the internal team at BMI (junior, medior, expert BDers and researchers and 2) a complete survey on what (big) data was currently being used at BMI and which challenges this posed to the team.

In regards to the element of how data can drive the creativity process, I encountered a big challenge because I first had to understand which type of data was actually being used at BMI and when. Through the three creative sessions I did with three BDers, I concluded that the nature of the used data highly depended on the step of the design process the project was at and who it was being used by.
However, I couldn't focus on all the steps of the double loop process, so I had to make a decision based on which step would benefit the team the most. Based on the literature review on the steps of 'understand' and 'ideate' were key and through the creative sessions I also realized the BD team would also benefit the most from it (since novice designers were the main party that indicated having challenges with data in these two steps the most).

My second learning goal was chosen because I always felt I lacked creativity as a designer. Throughout the years at the faculty and specially due to my experience in the course 'Build Your Startup', I realized my perceived lack of creativity had to do a lot with how the projects were being executed. A waterfall method, which pushes decision-making and ideation towards the end of a project, didn't fit me, while the agile methodology I followed during that course made me feel empowered and dynamic as I'd come up with new ideas on a weekly basis. Applying the agile methodology in all its possible forms (executing several design iterations and doing retrospectives on a weekly basis) made me make much quicker decisions and forced me to (even very Lo-Fi) ideate on how I could solve things. Even though most of the time the idea I created was not the right one, that didn't matter. Making something tangible helped me to 1) show myself I could be creative and 2) helped others understand what I meant.
Looking back at this method, though, making fast decisions meant that sometimes I'd forget to write down why I would take certain steps, which made reporting my thesis a bit more complicated. For future experiences, I will make sure to write my reasoning behind every decision.

My third learning goal indicated at the start of the Master thesis was to remain sane and keep a balanced work-life balance.
The rationale behind this also deals a lot with previous experiences, where I'd it was mandatory to work on weekends. This habit would always leave me unhappy because I'd feel my weekend passed by and I hadn't done anything but think about whichever project I was doing at the moment.
In the past six months I have been able to demonstrate to myself that not working on weekends is the best thing one can do. I went out, breathed fresh air in, did sports, went to some Dutch cities, saw/talked to friends, watched movies, etc... The majority of this I did with my partner, which made me realise how important it is to be with somebody who doesn't strive to be a workaholic either. Every Monday I felt I had had the best weekend of my life and that gave me so much more energy to be productive the rest of the week. So, for my future career, I strive to shut down my laptop on Friday, 17:00.

The last two topics I want to reflect on are 4) my final deliverables and 5) my collaboration with my TUDelft and BMI team.

Throughout these last twenty weeks I have surprised and impressed myself, because I always thought I lacked the skill of being detail-oriented.
This is, to some extent, still true, but applying the agile methodology and retrospectives allowed me to overcome this challenge. This approach had an extremely positive impact on the quality of my final concept, which not only was highly detailed for a SPD project, but also tackled a very complex problem.
I was able to comprehend the problem at BMI and solved it together with the starting research questions I began the project with. Furthermore, my project has shown that there are several ways in which a designer can 'understand', 'ideate', 'prototype' and 'validate'. Not only did I do desk research, interviews and ideation, but I executed surveys, facilitated and analysed several creative sessions, created Lo-Fi and Hi-Fi prototypes and created videos to validate assumptions. My final outcome, in my eyes, is therefore a very rich concept with detailed and validated sub-concepts for each of the three horizons, which is again, complex and rarely seen in the SPD Master.

Lastly, my collaboration with the TUDelft and BMI team could not have been better. All of my three supervisors really allowed me to take full ownership of the thesis and did not push an agenda on me. The feeling

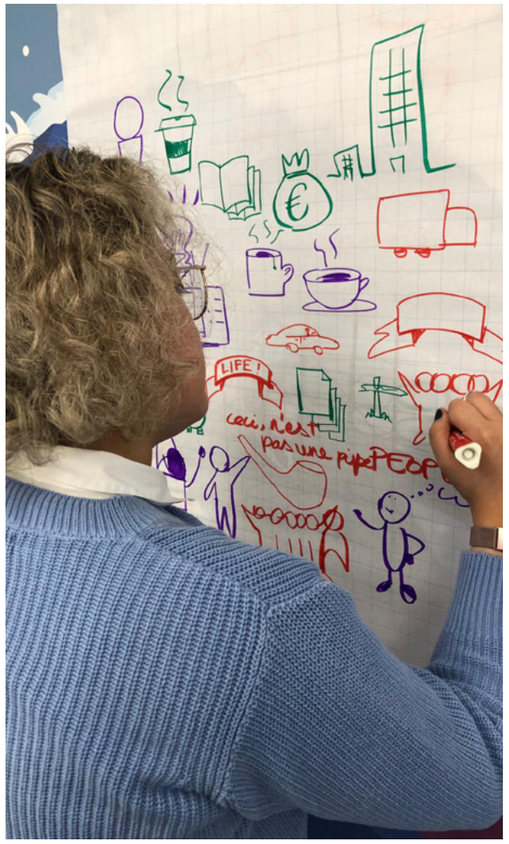


Figure 35: Sketching workshop at BMI (september 2020)

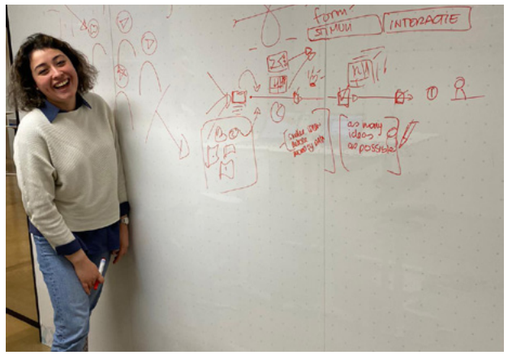


Figure 37: Exploration of stimuli and possible interaction (november 2020)

Figure 38: Coaching session with company mentor just before the Christmas vacation (december 2020)

Figure 36: Working with canvases to discover BMI's challenges with data (october 2020)

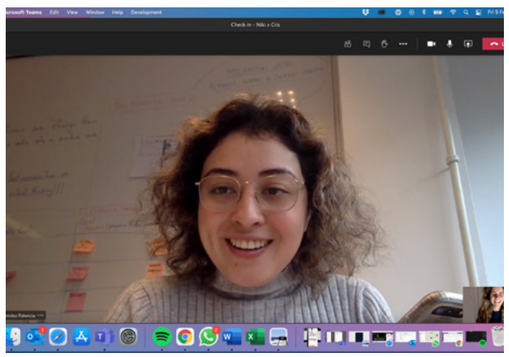


Figure 39: Coaching session with company mentor from the IDE faculty (january 2021)

was always that they were there to support me, academically and personally, which I enormously appreciate.

For instance, Niki captured snippets of my graduation journey with pictures which are shared in Figures 35, 36, 37, 38, 39 and 40. My biggest hope is that both of my teams have also experienced me as a proactive, motivated and assertive individual. Last but not least, I hope the BMI team can benefit from this thesis and feel that I brought the value I aspired to with it.

Figure 40: Greenlight meeting with supervisory team (february 2021)

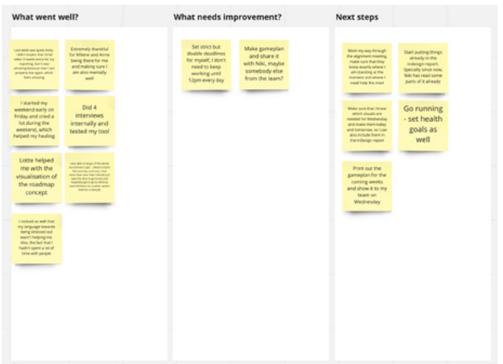


Figure 41: Weekly retrospectives

8. 6. Things I wish graduating students had spoken more about

I would like to finish my actual report with a brief text for future Master students embarking on the graduation journey soon.

This is my list of 'Things I wish graduating students had shared more of'

(i) In my humble opinion, make sure you choose a supervisory team based on personality affinity and relevancy to the project, even though the topic might deviate. This, of course, asks for a timely search for supervisors, which is also my advice to you. Some supervisors can take up a limited amount of students, so make sure you contact them several months in advance, even when the topic has not been defined yet

(ii) Working with a company might not be for everybody and might bring some downsides (for instance, losing at times agency over the project because it must satisfy the company's needs primarily). In my case though, there was a key benefit: possible implementation in the 'real world'. Also, access to relevant data and wisdom from colleagues and clients. And third, learning how to set up boundaries and show agency over the project

(iii) Definitely have buffer days and even weeks. The weeks I had set apart for taking a break and visiting my family were overtaken with my two-week mandatory pause because of being sick with covid-19

(iv) Also, in case you are working with a clearly defined problem statement and you have the amazing opportunity to have a large whiteboard, write that down on top so you're always visually reminded of the research questions you are trying to find responses for

(v) If you, like me, might feel like a typical waterfall design project is too long and static, consider working with an agile mentality. This might mean that you are 'forced' to have several design iterations or having retrospectives every week, so you keep track of your progress and create actionable points for the coming week. Start, ideally on Monday with the retrospectives, so you know what your to-do list is for that week

(vi) You may not sleep well the following six months, even if you don't work during the weekend. So please, make sure you take personal time off. Put things in perspective: this project will not determine who you'll become in life. And especially in these times,while a whole pandemic is happening around us. Health is extremely important

(vii) You may experience impostor syndrome several times during the thesis. Quick tip, force yourself to plan calls to share your project with random people. That call can go three ways: 1) you get positive feedback; 2) you get negative feedback or 3) the session isn't as fruitful as you expected. Getting positive feedback will help you observe how others look at your project and let you see that your work and dedication have a positive impact on them. If the feedback is negative, great things can also come out of it. You might already notice whether you have to scope down your project, or pitch it in a different way, or realise what you have to work on next.
Lastly, if a call doesn't result in the type of useful feedback you were expecting, this might also help you overcome impostor syndrome. You may realise you know much more about a specific topic than others and fuel your inner confidence. The key message here is:

'put yourself out there with as many people as you can and realise that your work is not shit'

With these final points of advice, I look forward to what life has to bring for me after the culmination of my university education. It may take a bit longer until I actually start working because I have a passion and dream I would want to explore at the moment: podcasting.

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Appendix A

BMI's current Business Model

As a design consultancy, BMI has a current business model that targets C-level management in large corporates (either B2B or B2C). Their way of working with clients is personal and makes sure that the client is always on board with the project. In this sense, a small group of employees from the client's side (4 to 5 employees) will always be engaged in the design process. They act as sponsors to drive innovation further in their organization and aim at convincing management to make strategic and innovative decisions based on the projects done with BMI.
The current manner in which BMI captures value is by its main four value propositions to clients: educate, strategy, transform and accelerate. The way this is made concrete is by executing projects where there is either a defined fee or per hour fee, by selling training programs or through their books.

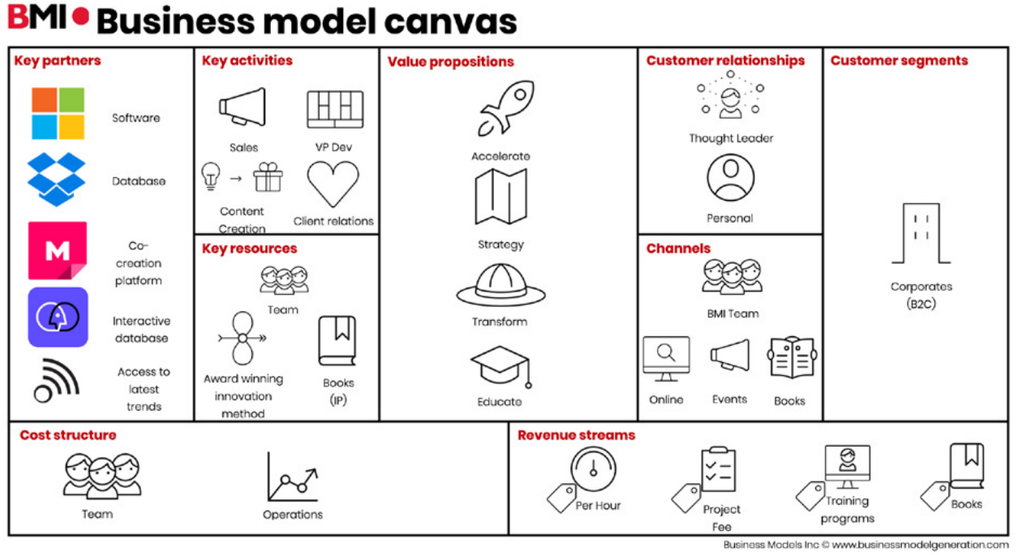

Figure A1: Current business model of BMI

Appendix B

Survey on big data usage at BMI

This survey was done in week 5 of the thesis. The main goal was to understand whether big data was something the BMI team was acquainted with, what it meant to them and understand what they spotted as the main challenges.
The survey was targeted at mainly the BDers within the organization (total of 17, counting the other international locations) because they actively work with the 'double loop' design process. The total amount of people who reacted to the survey was 17, out of which 16 responses were valid (1 of them belonged to someone in the sales team, and therefore not a BD).

The questions that were asked were the following:

(i) What does BIG data mean to you?
(ii) What type of BIG data sources do you currently use?
(iii) In which phase of the double loop do you currently use BIG data?
(iv) What do you find most challenging about integrating BIG data in the design process (double loop)?
(v) Where do you store the work you've done for a client?
(vi) Is there a specific way in which you do so?
(vii) Have you ever used Batterii for data saving purposes?
(viii) When and what for do you use it to store your previously-done work?
(ix) How would you rate your experience with it?
(x) When would Batterii be perfect?

The main insights out of this survey was that big data is not a type of data that is currently being worked with within the organization. There are several challenges with it such as:

(i) there is no common understanding of what big data means, every respondent had their own definition of it

(ii) the two most common challenges seemed to be that it is difficult to extract insights from it, specially when the BD has to execute the data analysis and that finding the right sources for big data are difficult to locate

(iii) every respondent had a personal data saving structure in the current database (Dropbox)

(iv) there seemed to be no general strategy to save the data gathered and created

(v) there is a second database which some team members are starting to use which is called Batterii (20% of the respondents). This tool is meant for online customer research but can also serve as a database. However, the tool has not been used yet as a search engine for previous work, even though some BDers have used it to save their own past work

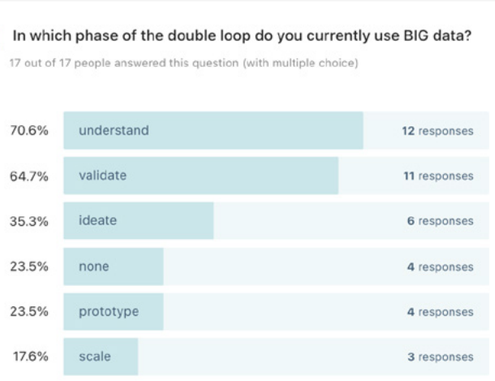

Figure B1: Results from question (iii), analysed by the tool (Typerform)

Appendix C

Research on big data

As previously mentioned in the methodology chapter, the 1st design iteration was focused on the usage of big data in the strategic design process. I executed research to understand what the concept properly entailed and whether this was something valuable for BMI.
Big data is defined by the (large) volume, (fast) velocity and (extensive) variety of the information being gathered (De Mauro et al., 2016, 122-135). Examples of big-thin data are big datasets built from sensors, such as location data collected with a GPS sensor or the growing social media data (McSharry & Thomas, 2015). In order to make proper use of that information, technology and (computer) analytical methods are needed (Davenport et al., 2012, 22-24).

As explained by McSharry and Thomas (2015) big data helps organisations get better insights at their current business and how this can be optimised. As BMI would describe it, big data supports the business in its 'execution' tasks and optimises their existing value creation, as opposed to creating ('search') innovative value. For instance, A-B testing, as Kun (2020) and the data extracted from it is normally used in the later stages of the design process, acting as validation parameters.
Furthermore, as Kun (2020) concluded, big data analysis requires a specific set of skills which are particular to data scientists.

For the ideation step of the 1st design iteration, I explored how big data could be used in the context of one 'accelerator' project that had just started. This project had to deal with sleep-related problems. I became acquainted with several open source databases such as (Opendata CBS, n.d.) and (Statista, n.d.) and gathered and analysed the data. I used Excel sheets for the analysis and tried to see whether there were any interesting and useful insights for that specific project.

In order to validate this design iteration, the results were shared with the BDer responsible for that specific 'accelerator' project.

After having realized an initial literature research, interviews within and outside the company and tried incorporating big data in an 'accelerator' project, I came to the realisation that big data currently does not fit the capabilities and needs of BMI.
First of all, big data is currently in its majority being used to exploit an organization's already-owned assets, not to gather insights that might indicate new value propositions options.

Second of all, designers are currently not taught about data science, which is the type of tools and skills that they would need to distill insights from big data. Business designers at BMI also suggested in the survey of big data, having difficulties with it because of their limited knowledge in this specific field and in case they had tried previously, they suggested being too time consuming.

Third of all, not all clients possess big data of their own, which makes it extremely challenging for BDers to first access useful open datasets, without having the certainty that the data gathered and filtered would give useful insights to the project as they might be too broad or general tackle the challenge in question. In case a client would possess big data of their own, it would be heavily positioned under a NDA, which would make it impossible to reuse those datasets for other projects within BMI.

For all these reasons, the use of big data within BMI is not a clear win as it most probably be time consuming and the rewards of it would be extremely limited in their application in an 'accelerator' project.
To conclude, although the starting point of this Master thesis was the usage of big data in the design process of BMI, the student understood

this was neither viable nor desirable within BMI.

However, in case BMI were to ever try introducing big data in their design process, I leave herewith a set of tips and tricks, based on my exploration in the 1st design iteration.

i) Organisations such as frog design (Minah, n.d.) have already tried implementing data science in the design process. This means a multidisciplinary team might come in handy, since data science skills are still quite particular to that field and it is not as common to see designers possess data science skills

ii) Big data might come in handy to scope down the project's focus. For instance, if the starting point of the project is 'sleep related problems', it would be interesting to see which problems are the most relevant for sleep. The CBS data, although quite general, gave me insights of who suffered the most from these problems and how they were caused (burn outs or household-related stress for instance). This might come in handy once an idea has come out of an 'ideate' workshop and a first target group must be found for validation. It might also be handy to understand who has the biggest pain point and design accordingly

iii) Excel can already be quite good of a tool to distill useful insights from larger datasets. Although softwares like Python provide much faster solutions and more thorough analysis, the BDer must first learn to code

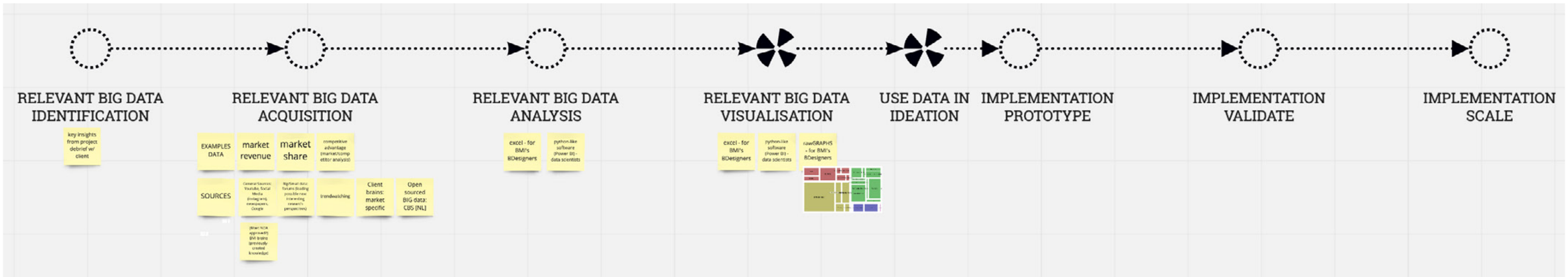

Figure C1: Tips and tricks for BMI when introducing big data in the double loop (possible software and sources)

Appendix D

Three creative sessions with BDers

To answer the sub question:
'Which kind of data can be used, in which step(s) of BMI's design process can it be implemented and how can it fuel the design process?'
I executed three creative sessions with 3 BDers.
The main assumption I aimed to test during these experiments was 'data/info level works best as external stimuli'. I wanted to understand which building blocks are the most useful and result in more creative ideas during the divergence phase of idea generation. The parameter that was kept in mind was 'fluency', as it is most relevant in the starting phase of ideation, before the resource team starts clustering and converging. I was aware that within the time given, the outcome would not result in full-fetched business model canvases, but rather business model options (e.g. what if the company started targeting working dads? What if we provided them with a service that would pick up their kids after school?)

The setup of the experiment followed a similar 'accelerator' structure, where the problem statement is clear and the desired outcome is close-ended (business model options) was as follows:
i) introduction to the case, based on the case the company executes when doing recruitment for new team members. The case posed the following questions to the participants: "Your challenge is to come up with as many business model options as you can within the time and resources provided for the value space of 'Empowering children to act on today's and tomorrow's sustainability issues' for the company LEGO
ii) exposure to the participants to the content and canvases they could make use of during the 'understand' phase of the case
iii) trigger questions to help them ideate new value propositions and business model options for the company

See figure D1 to understand how this actually looked like
The participants took part in this creative session individually and the session lasted one and a half hours in each case. They were briefed with the introduction to the case a few days beforehand. The insights of the sessions were gathered in the BMI experiment canvas the student used to set it up (figure D3).
The most important insights from the sessions were the following:

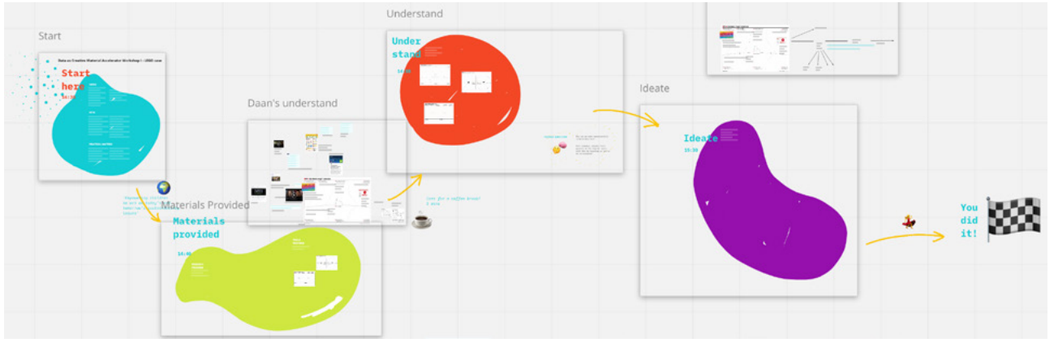

Figure D1: Miro board where the creative sessions took place

i) During ‘ideate’, the role of business designers mainly is to trigger the client to think out of the box with the help of the nine elements of the business model canvas. This means that they would ask ‘What if... we started targeting a new customer segment?’. This conforms a brainstorming session, which is the idea generation technique most commonly used at BMI, or how they name it ‘freswatching’. This is the type of content that is mostly used during these sessions and is therefore the most useful one. The external stimuli takes form in examples of businesses that have already made an interesting business model shift, which are normally represented in a case study (powerpoint presentation)

ii) BDers are sense makers and facilitators during the ‘ideate’ step. This has a huge impact in the way that the information gathered in the ‘understand’ step is depicted

iii) The novice designer experienced the phenomenon addressed by Lu (2020) in which novice designers struggle with data as they find it easily overwhelming

iv) The novice designer tried looking at the data provided but soon started to find external stimuli online. The medior designer was highly skilled at scanning through the content given and strategically start thinking of possible outcomes. He was also the one with the highest score in fluency (6 options). The expert designer did not look at the data given and relied solely on his expertise (he concluded the workshop with 4 ideas)

v) It is almost impossible to structure data following the DIKW frame, as the distinction between one level or the other is extremely challenging

vi) The scope of the project was at this point too broad. The project had to be further scoped, otherwise, it would not solve anything. At this point, though, the student realized that the business model canvas was the canvas most used during ‘ideate’ sessions. And that the content that would spark the most creativity (based on what is currently being done at BMI) are the 9 elements of the BMC

vii) Although I wanted to see which building block of information would create the most business model options (fluency), this was highly impossible for two main reasons. Firstly, distilling which element of information from the miro board had given the most inspiration was not feasible as it was analysed, in the majority of the cases the BDers would combine the building blocks they were given and create ideas based on the combination. Secondly, because the level of detail of the final outcomes at the end of the ‘ideate’ part of the session were extremely varied; some being business models canvas that were partially finished and some just being spoken opportunities during the sessions

Figure D2: Novice designer working during the creative session

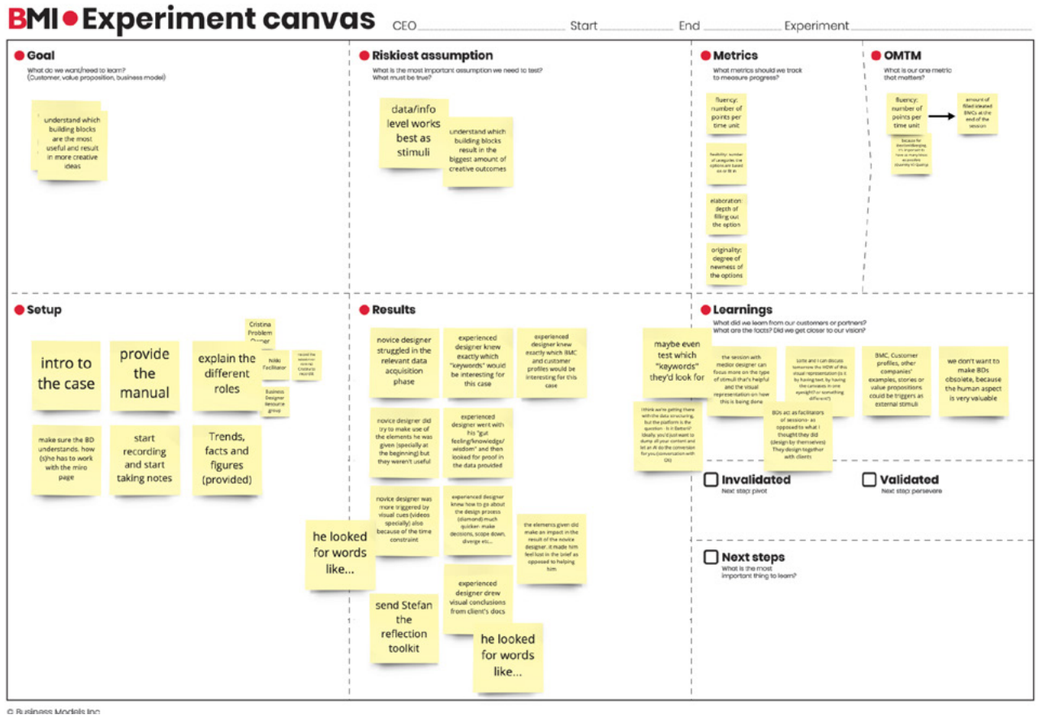

Figure D3: Experiment canvas used to craft the creative sessions, check assumptions and create follow-up steps

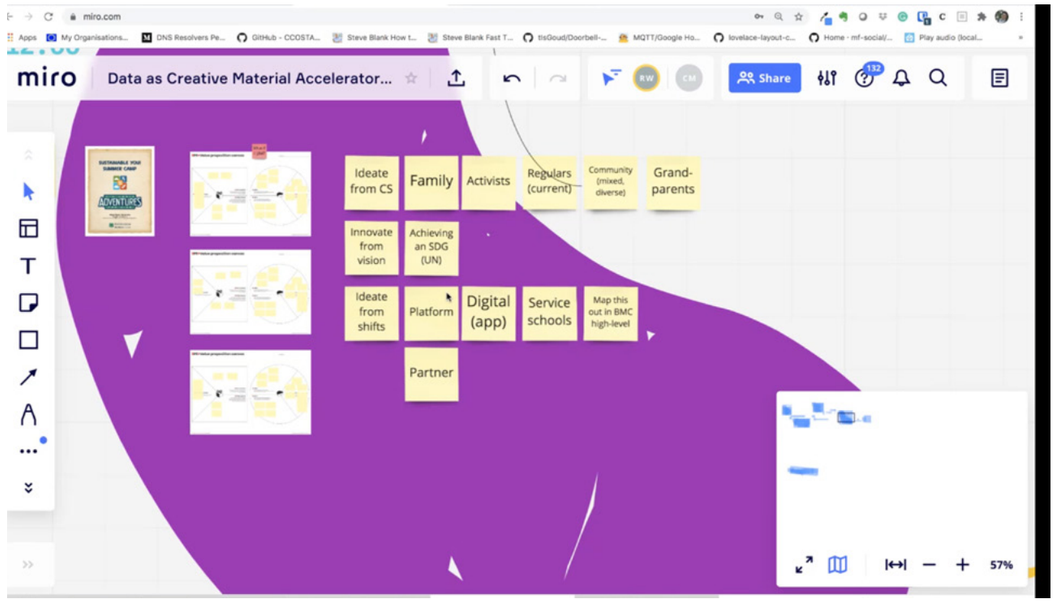

Figure D4: Online creative session with expert designer

Appendix E

Interviews in and outside BMI on the topic of (big) data

The interviews (5 outside of the organization with experts in the area of big data, data usage in design and back-end development and 8 inside the organization with BDers) were analysed by the student (solo coding) manually as the majority of them took place physically and the student was able to table in vivo notes and categories. The technique of 'process coding' (Saldana, 2015) was used to code the interviews, to describe the steps taken to handle the challenge in particular (data usage within organisations)

Theme	Category	Code	Quote
Data customers	BDers Clients	Using the data to fill canvases in Using the data to inspire client / inflect a mindset change in them	"You have to keep the main data customer in the center" "In the end, the power of data is that we can create value for our customers and that they are willing to pay for it"
Data acquisition	Existing content New content Third party data	Searching for already-existing content in BMI's brains Searching for new content via client Searching for new content in trendwatching.com Searching for new content online	"BMI has its own brains, with all the data that we already possess from previous projects" "We mainly use Dropbox to store the work done" "We always receive important documents from the company and place them in the 'received documents' folder"
Nature of data	Viability Desirability Qualitative Quantitative	Looking for existing successful business models (examples) Looking for interesting customers	"To understand the client's customer and potential interesting stakeholders, we go on client safaris"
Data analysis	Data customers	Filtering which data is interesting Analysing the data by BDs	"From the data we receive from clients, only about 20% of it is relevant or useful for our design work" "Designers are data savvy"
Data visualisation Data synthesis	Use of canvases Abstraction	Using BMI canvases to portray information Using presentations to inspire clients and help them think 'out of the box' Using information that has been analysed/abstracted	"We don't really use the sources where we got insights from in the process"
Current usage in the double loop	Understand Ideate Prototype Validate	Using data in the understand phase Using data in the ideate phase Using data in the prototype phase Using data in the validate phase Not using it enough in the ideation phase	"The majority of it [data] we use for 'understand', but not to its full potential in 'ideate'"
Data structuring	Unstructured Existing databases	Structuring based on personal system Saving it centrally and structurally through a data catalog Searching for the most recent	"It is crucial that we provide the team with the most updated content, by for instance, having a filter button, like Batterii has"
Data sharing	Dropbox Microsoft teams Whatsapp	End result Frictionless experience	"How do you eat an elephant? In small pieces"

Theme	Category	Code	Quote
Challenges	Data retrieval Change in BMI's culture Difference with competitors	Saving data in a static database Dealing with the life of a consultancy Knowing there is a lot of data in the BMI brains, but not leveraging it	"I know the power of data can be used at BMI, but it will require a huge culture change within the organisation" "I know there is a lot of wisdom, but it resides in the brains of my colleagues, which unfortunately, I don't have access to"
Opportunities of exploited data usage	Use data for ideation Smart ways to gather data	Looking for data on Batterii Looking for data on Vizologi	"We have so much data already that we could have a randomise button and allow ourselves to be inspired by it" "BMI data would allow clients to know but also apply the 'so, what?' mentality and act upon it, which it something the others [Vizology, Trendwatching] can't do" "BMI is using Batterii as a pinterest page, but by giving the content filters and attributes, the content would be found faster"
Previous use of big data	Project where big data was used Examples of big data usage in the design field	Using 2nd party data (from client) regarding supply chain Using big data to improve a customer journey Using big data for execution Resulting in time consuming tasks Being done rather by data scientists	"We used the company's own big data to understand in which phase of the customer journey they could make the most value" "Amazon for instance has immense amounts of data to understand how they can create more value to their clients in the customer journey"

Figure E1: Coding scheme for analysis of interviews

Appendix F

Validation of H2 with novice BDers

As part of my final design iteration, I wanted to test solely the content of the Horizon 2 tool. The interaction with the tool (the use of keywords for search of external stimuli) had already been validated with 3 semi-structured interviews with BDers.
Now the goal was to understand whether the content would stimulate them to create an ideation session with a client, which is the ideal use of this tool for internal use. Normally, this session is also done with a client, in which they create together an ideation deck that will allow the resource group to get triggered and think innovatively.
This session was one hour long. Four novice designers took part in the session, divided in teams of two. The reasoning behind the selection of only novice BDers was because they are the ones most keen to find inspiration but easily get overwhelmed, as explained in literature. Splitting them in two teams allowed me to see potential differences in the challenges with the content provided.

The set up of the experiment was conformed by an introduction to the session and the challenge (design an ideation session for the specific client), exposure to an explanatory video of the tool, content available for the session, space for the design of an ideation session and a 10-minute discussion space where open ended together with scale-based questions were asked.

Referring to the categorisation of external stimuli given in Chapter 4, the best combination had been proven to be pictorial with a short textual description. Furthermore, in regards to 'understand' content it was validated that closely-related stimuli to the problem at hand was most relevant, as it is used to paint the picture of the current business. For an 'ideate' session, the relevant external stimuli varied on which horizon the 'accelerator' project was meant to tackle. This was represented by the filter "How far out of the comfort zone do they want to go?"
The parameter that was aimed to be observed was 'fluency' and 'flexibility' of ideas, to

Figure F1: Content provided to BDers during session

Figure F2: Design an ideation session for a client, miro board of one of the groups

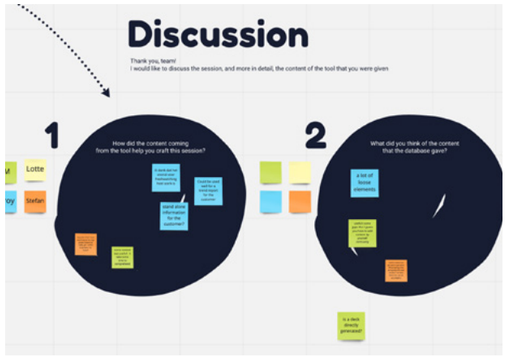

Figure F3: Some questions were asked at the end of the session, to review the content of the tool

understand whether the external stimuli provided helped the divergence phase of idea generation.

The main insights from the session were:

i) The content provided was relevant to the BDers, as they all averaged 4 out of a 5-point scale

ii) The content provided was inspirational, as well averaging 4 out of a 5-point scale

iii) The way in which the content was depicted still caused overwhelm in the BDers.They missed structure. The common advice was to provide a click-through or 'bumble' selection method, that would allow them to go through the content one by one, as opposed to all at the same time

iv) They also missed the translation towards how the ideation deck then would be made, for which they advised having the content separated into blocks such as 'context', 'current business model', 'vision', 'customer segment' or 'freshwatching'

v) They felt the content was ideal for a 'freshwatching' session, which is where divergence mainly takes place during an ideation session

vi) The best type of external stimuli was pictorial (full image) and short textual description. This would also be an ideal setup, especially for when the BDer acts as a facilitator and has to quickly scroll through several slides to trigger the resource group as much as possible in a short time span

vii) Normally, during an ideation session, the decks hold around 3-4 freshwatching examples and they tend to be closely-related to the problem at hand. Based on the analysis of the session, one of the groups was able to collect 11 possible examples for the phase of 'freshwatching' and the other 3. This rather large difference might be related to the latter team and one of the team members, who has less experience as BDer. But in regards to the two parameters that were being tested during this session, the first team did show increased fluency and flexibility, as all 11 ideas were rather distantly-related and varied from one another

These insights, although extremely valuable, were not integrated into the final concept because of time constraints. However, they have been properly explained in the 'further research and recommendations' part of Chapter 8.3.

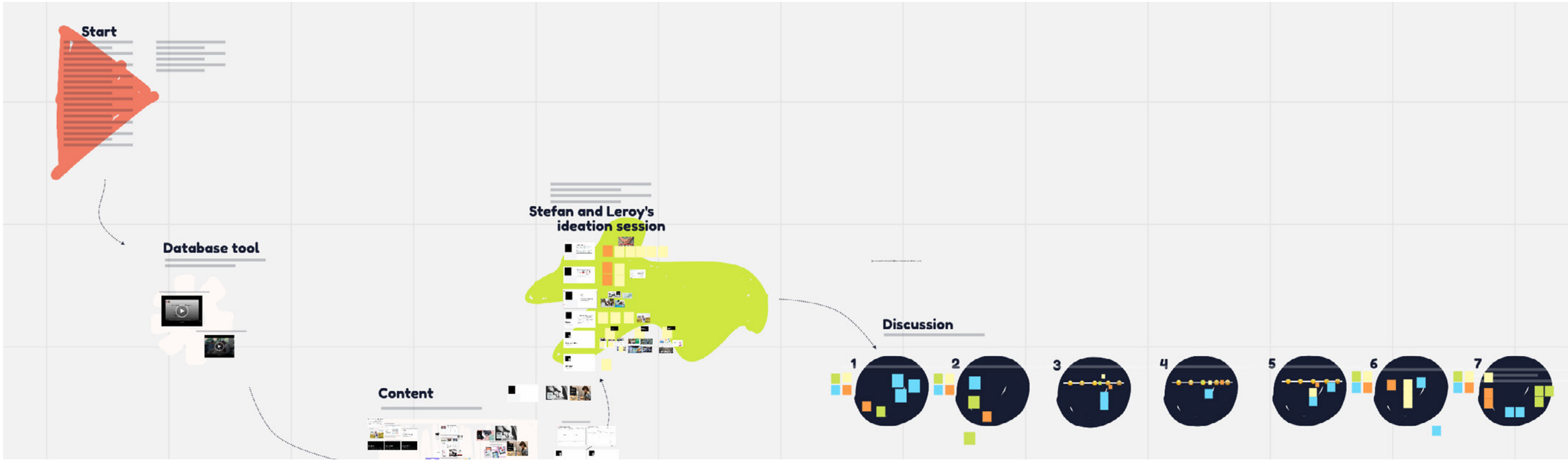

Figure F4: Complete overview of the miro session

Appendix G

Initial data structuring examples

The data structure strategy proposed in figure G1 showcases an example of the key attributes/keywords. However, I have created an overview of some of the initial options for each of the keywords. This overview below is meant to help BMI and its data partner build the database.

Figure G1: Data structure example for key attributes that can be standardised in the database

Appendix H

Data-driven BMC of BMI

As indicated in the conclusions chapter, BM AI allows BMI to keep creating value for their clients. The second horizon solves the main challenge of the company, which was summarised as ‘limited scalability to their business activities’ in Chapter 7.1. The ‘accelerator’ program can be done much more efficiently and makes use of highly curated and inspirational information, which results therefore in higher project marginsa more inspired BD team.
The third horizon of the roadmap has direct connection to the end beneficiary of the information, the client. As discussed during the execution of this Master thesis with the BD team, the strategy would be to use the Business Model Innovation tool as a new channel to ‘hook’ new clients. These new ways of value creation are represented in the figure below.

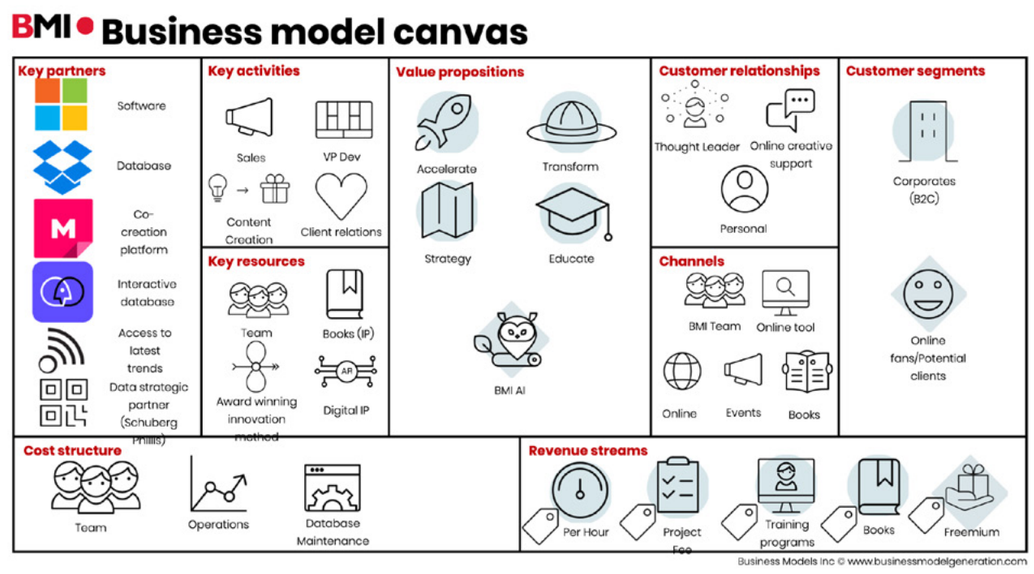

Figure H1: Proposed BMC for a data-driven BMI, as result of the BM AI concept

Appendix I

Initial design brief

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

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

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

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

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

family name: Mendez Palencia
initials: C I given name: Cristina
student number:
street & no.:
zipcode & city:
country:
phone:
email:

Your master programme (only select the options that apply to you):
IDE master(s): ( ) IPD ( ) DfI (1) SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: ( ) Medisign
( ) Tech. in Sustainable Design
( ) Entrepeneurship

SUPERVISORY TEAM **

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

** chair: Dr. Kranzbühler, A.-M. dept. / section: MCR
** mentor: Dr. Gonçalves, M.G. dept. / section: MOD
2nd mentor: Niki Seelen
organisation: Business Models Inc.
city: Amsterdam country: The Netherlands

comments (optional)

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

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

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

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF
To be filled in by the chair of the supervisory team.

chair Dr. Kranzbühler, A.-M. date - - signature

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

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

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

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

YES all 1st year master courses passed

NO missing 1st year master courses are:

name date - - signature

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

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

Content: APPROVED NOT APPROVED

Procedure: APPROVED NOT APPROVED

comments

name date - - signature

Personal Project Brief - IDE Master Graduation

Big data as creative material in the strategic design process — project title

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

start date 14 - 09 - 2020 26 - 02 - 2021 end date

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

In a technological-driven world, we are more often confronted with the notion of big data than we'd expect. The internet has allowed allowed us to produce and access an unlimited amount of sources and types of data. This means all data points are mostly available to anyone interested in searching for them. One of the biggest challenges of big data usage is however to be able to acquire knowledge and wisdom from it, which requires a complete different skill set from it. For designers, specially, not being taught extensively on big data application, the biggest challenge is how to incorporate it into the design process [1] [2] [3].
Data can be divided into two main types. According to Bornakke and Due [4], big-thin (quantitative) data are extensive in numbers but they lack context around the data available. Examples of big-thin data are social media data collection, media results on advertisements, revenue statements on a brand's top selling product or sleeping measurements tracked by health watches [5] On the other hand, small-thick (qualitative) data responds to smaller amounts of data points which aim to help understand human behavior with detailed explanation on the human's context. Examples of small-thick data are ethnographic observations, interviews with end users or co-creation sessions with clients or consumers.

Not only does the nature of these two main data types differ, but so does their use in practice. On the one hand, companies tend to have a large arrays of big data, such as market research or trend research. Companies and decision-makers within them are mostly confronted with the "I know" mentality where hard facts/data drive strategic verdicts. On the other hand, designers are more often driven by qualitative research and the "I think" mentality where decisions are made based on a design process [1] that companies don't fully put their trust in.
Up to now, designers have a) either denied the importance of big data to their field, b) been indifferent towards it, or c) been driven by it only when it came in handy [6]. It can be observed that the potential of big data usage in the strategic design process hasn't been fully exploited yet [7] That leads to the question: what if designers could make use of these big data points to drive their creative process and unlock unforeseen connections and possibilities?

A noticeable limitation of this scoping decision is the implementation of both big-thin (quant) data and small-thick data (qual) in the design process. However, for timing reasons, this thesis will focus only on the usage of big-thin (quantitative) data.

Business Models Inc (BMI) is a design agency for strategy and innovation in Amsterdam. Its clients, belonging to various industries, require their help to create innovative business models in order to stay relevant to their customers [8] BMI makes use of the "double loop" design process (figure 1). This process includes four main stages: "understand" the client's context, "ideate" on the captured insights from previous phase, "prototype" a plausible solution and "validate" it [9]
At the beginning of every case, BMI is provided big data belonging to several sources. These can range from trend watching reports, the client's internal data, previously-gathered insights by BMI's employees or general sources such as Google or Youtube. All these data points are essential for the better understanding of the client's market context, current business model, value proposition and customer. This is all currently only used in the "understand" phase of the double loop, also presented as abstracted terms that the business designers can't fuel their creative thinking with. Furthermore, these insights aren't being brought along in the rest of the loop.
BMI and its design process can benefit from big data usage by strengthening the creativity of their ideas and the credibility of the design process.

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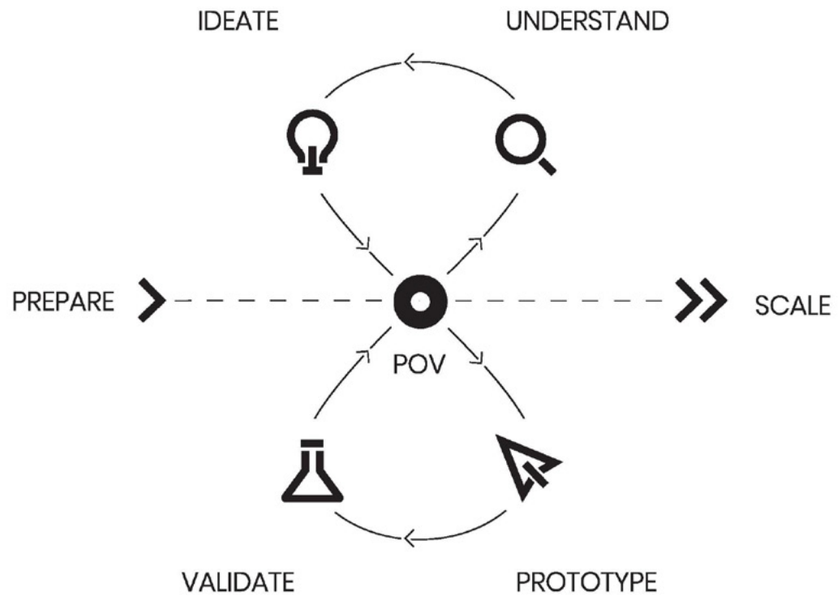


image / figure 1: Business Models Inc's double loop/design process

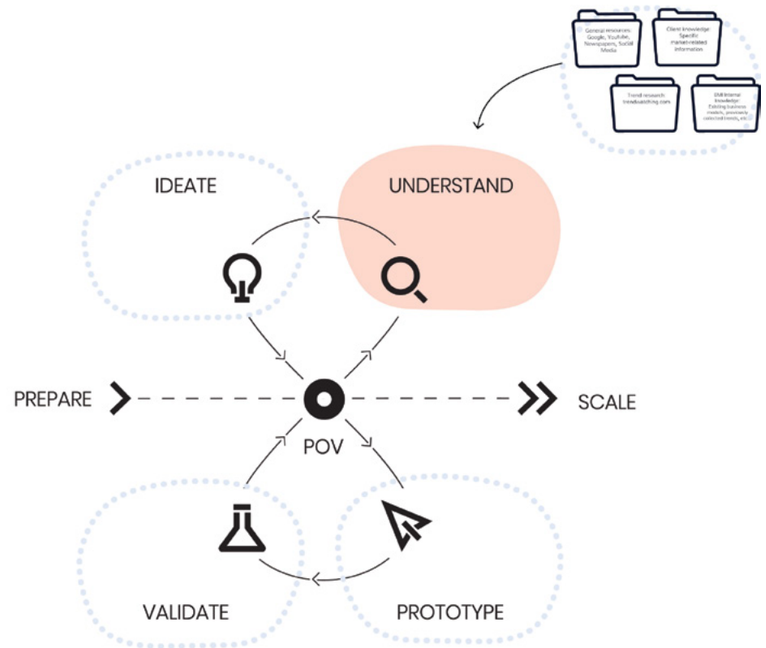


image / figure 2: Biggest challenges and opportunities of big data incorporation and usage in BMI's double loop

PROBLEM DEFINITION **

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

Big data isn't being used to its fullest potential in the strategic design field. It could highly benefit the strategic design process in two main manners: allowing the design process to unlock unforeseen strategic ideas and adding credibility to the design process. For BMI, it can be of added value for their strategy (future visioning and roadmaps), and accelerate programs (concrete new business models).

With this in mind, I seek to investigate how designers can be welcoming of big data and use it as creative material in the strategic design process. In this case, how BMI's business designers can make use of their client's data to drive strategic thinking. More specifically in this project, the question will be two-fold:

- Which kind of data can be used, in which step(s) of BMI's design process can it be implemented and how can it fuel the design process?

- Is there a way to efficiently gather and re-use data?

Some of the anticipated limitations of this project are the diversity of industries BMI's clients belong to. Furthermore, the complexity of the incoming data from BMI's clients, which might require high understanding skills on the business designer's side. Lastly, it must not be forgotten that qualitative data is of equal importance for the design process. It will be however, for scoping matters, not introduced in this graduation project, which will most likely result in a need for further exploration on how good practices of qualitative and quantitative data can be brought together in the strategic design process [11]

ASSIGNMENT **

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

In order to tackle the three-fold problem, the assignment will consist in creating a strategy for BMI to use data as a creative material in their design process.

In order to tackle the two-fold problem, the assignment will consist in creating a strategy for BMI to use data as a creative material in their design process.

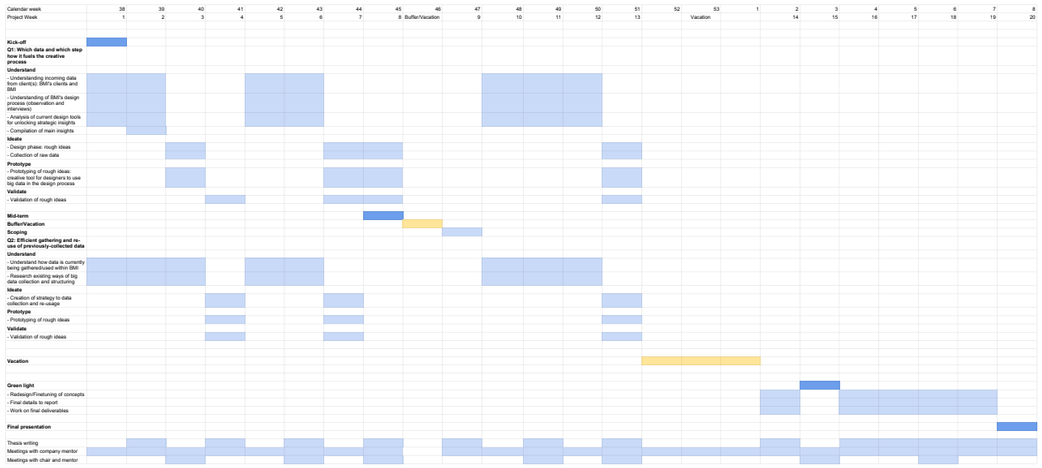
Specifically, with references to BMI's design process, the graduation project most likely tackle understanding which type of data comes in from clients; in which phase(s) of their design process it can be used (understand, ideate, prototype and validate); how to make it a design-fueling element and how BMI can smartly go about the data collection and re-usage.

Because of BMI's planning, I'll have the chance to follow two client cases closely in which I'll be able to test my designs and learn from them.
The expected outcome would be (without setting too many constraints) a toolkit or canvas in which all three folds of the problem would come together.

PLANNING AND APPROACH **

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

start date 14 - 9 - 2020 26 - 2 - 2021 end date



My planning includes two break periods. The first one, after mid-term, which I've actually set as a buffer, in case there are any unexpected matters. The second one extends over the Christmas break. Because of the COVID-19 crisis I haven't been able to spend time with my family back home, so this is a time I'd like to spare for spending time with them.
Following BMI's double loop design process, I'll also include an agile methodology (scrum) to my process in order to enforce the idea generation and prototyping phases in it.

Lastly, there will be a scoping moment after the midterm evaluation. Because the brief is quite ambitious, it'll be beneficial to have a moment of divergence in order to be able to produce the best result possible.

MOTIVATION AND PERSONAL AMBITIONS

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

During the course of the SPD Master Program I found myself working in projects where a lot of information was gathered at the beginning of it but never again used or looked at. Its main purpose was only to fill in the report's "research/insights" part. I kept wondering if data could actually be used as creative material for the design's process, therefore making the results much more fact-driven than "I think" statements. This could improve a client's perception of the credibility of design as it'd include data-driven decisions clients are appealed by. During my last experience as an intern at Unilever I had the opportunity to understand how data is used in the business; Not to the extent of driving strategic and creative decisions though. These reports are mainly used for performance tracking and are furthermore not used for a creative design process.

Myself being both analytical and creative, I seek to understand what data can mean to the design process. Furthermore, I have observed very few strategic designers having the more analytical mindset and being driven by their gut feeling. Not saying that that approach is incorrect, but my personal drive leads me to a data-driven approach. I see this as a clear gap in the professional landscape of strategic design.

Last but not least, there's a high interest from my side to work together with Business Models Inc. I've been following their approach to innovation for a while now and I believe their team is what I'm currently looking for. Their ability to work with several clients in a short period of time, allowing me to get to know different industries and how data is used throughout them and applying the agile mentality is something that attracts me. Their projects tackle business models, which to me as a strategic designer, is the perfect approach to meaningful innovation.

References:
[1] Sanders, E., & Stappers, P. (2014). Convivial design toolbox. Amsterdam: BIS.
[2] Thomas, R., & McSharry, P. (2015). Big Data Revolution. Wiley.
[3] Deckers, E. (2018). Data Enabled Design. Presentation, UXDX.
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[5] Ovenden, J. (2020). Why Big Data Needs Thick Data. Retrieved 10 August 2020, from [https://channels.theinnovationenterprise.com/articles/why-big-data-needs-thick-data]
[6] Kadam, A. (2016). Data Driven Design Methods [Video]. Retrieved from [https://www.youtube.com/watch?v=N_kcRB8O3aI]
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[8] Our way of working - Business Models Inc. (2020). Retrieved 1 September 2020, from [https://www.businessmodelsinc.com/about-bmi/our-way-of-working/]
[9] Pijl, P., Solomon, L., & Lokitz, J. (2016). Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley.

FINAL COMMENTS

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

Master thesis by
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In collaboration with