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ASSIGNMENT OF BACHELOR'S THESIS

Title:	Product Design of Data-driven Solution for Personalizing Static Content on Websites
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Instructions

1. Define and describe the responsibilities and goals of a person performing in a role of a Product Manager during the whole lifecycle of a product. Focus on product design processes related to innovative, data-driven products. Find out what does the involved company (DataBreakers) expect from their Product Managers.
2. Analyze the data-driven website personalization market, find potential customers for the proposed product and uncover their problems and needs. Research the competition and consider alternative solutions.
3. Based on the findings from previous points, define the minimal viable product and the product strategy from design, development and business point of view.
4. Get product feedback from both the potential customers and the involved company. Refine the product vision so it addresses the most crucial parts of the feedback.

References

Will be provided by the supervisor.

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Prague February 2, 2018

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Bachelor's thesis

Product Design of Data-driven Solution for Personalizing Static Content on Websites

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May 15, 2018

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Declaration

I hereby declare that the presented thesis is my own work and that I have cited all sources of information in accordance with the Guideline for adhering to ethical principles when elaborating an academic final thesis.

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Czech Technical University in Prague
Faculty of Information Technology

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Abstrakt

Tato práce popisuje proces vývoje produktu pro personalizaci webových stránek na základě strojového učení z pozice produktového manažera. Definuje roli a zodpovědnosti produktového manažera a teoreticky popisuje proces vývoje nového produktu. Tento popis je pak aplikován v reálném světě. Výsledkem této práce je definice minimálního produktu, který je však hodnotný v očích zákazníka, technologicky uskutečnitelný a potenciálně ziskový.

Klíčová slova produktový management, produktový manažer, produktový design, umělá inteligence, web, personalizace, mvp, b2b

Abstract

This thesis describes the process of creating a machine learning-based website personalization product from the product manager's perspective. It defines the product manager's role and responsibilities, and describes the process of creating a new digital product in theory. This process is then applied in the real world. The result of this thesis is a definition of the minimum viable product that is valuable in the eyes of a customer, technologically feasible and viable business-wise.

Keywords product management, product manager, product design, artificial intelligence, web, personalization, business, mvp, b2b

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Introduction

Motivation

Artificial intelligence and machine learning are currently disrupting almost every industry that produces raw data. The computing power that has become available in the past several years allows us to analyze said data and produce predictions that were simply unavailable until recently. The interesting thing about these predictions is their universality - it seems that everyone is able to benefit from being able to predict the future, no matter the industry. The result is that everyone seems to be hopping on the bandwagon; every industry leader, no matter whether it is automotive, marketing, or finance is investing heavily into this technology.

However, it is not only the big corporations pushing the edge; there are also small firms moving at even faster pace. DataBreakers, the startup with which this thesis is developed, is one of these. The results of their predictive algorithms are quite impressive. They are able to increase the turnover of an e-commerce website by tens of percents (+ 26% for tescoma.cz, + 20% for glami.cz and +5% for alza.cz to name a few) just by predicting what the user will want to buy next. Also, they can cut up to 90% of costs while doubling the engagement of an online marketing campaign by predicting the targeting results.

The area to be tackled by this thesis is even more ambitious. Currently, the static online content served on websites is very one-size-fits-all. Yes, we can reorder the e-shop products based on what we think the customer is interested in buying, or recommend articles based on what the user has already read, but that is about it. The static, informational websites such as homepages and landing pages are almost untouched by personalization. This thesis aims to change that.

Bringing personalization into the static website design will elevate the web browsing experience to a higher level. The data-driven model constructing the website in real-time will predict what the user is looking for and serve it where

the user is going to be looking for it. Moreover, not only the content such as text or imagery can be personalized, but also the visual side can be changed according to the user's preferences and needs. Website accessibility can be improved immensely by this.

However, in these fast-paced, customer-oriented days it is important to not only focus on what features we are building, but also on how and why we are building them. A mind-blowingly innovative product using cutting-edge technology is worthless if there is no one to sell it to. Therefore, this thesis will approach the matter from the product manager and the product designer perspective, using a mix of lean and effective methodologies to discover, design and sell the product. This should result in a B2B product prototype that is built quickly and has paying customers even before it has officially launched.

These are the reasons why I picked the topic of website personalization and the product managerial approach; also, I hope that I will be doing this for living someday.

Goals and structure

The main goal of this thesis is to explore the process of building a brand-new B2B product from the position of a Product Manager.

The first, theoretical part of the thesis will be focused on the role of a Product Manager. Several interviews with Product Managers at different companies will be conducted to get a variety of views. An in-depth interview with the CEO and the CTO of DataBreakers should clarify their specific needs and wishes. It is also important to find out as much as possible about how they approach product management. Based on all this, the role required for the purposes of this theme will be defined. Relevant literature will be researched and cited as well.

The second part will describe the product creation process in great detail, focusing primarily on the PM's role. It is absolutely necessary to start with getting deep and up-to-date knowledge of the customer, data, business and the market. Only then can the product discovery, rapid prototyping and testing follow. After settling on the right product, the product design and system architecture will be proposed for the MVP.

After settling on a suitable MVP outline, feedback from both the potential customers and from DataBreakers will be collected. At last, the future of the product will be discussed.

Chapter 1

Theory

1.1 The need for a Product Manager role

In general, selling and buying is merely an exchange of value. This is even more true when it comes to digital products — the only reason people or companies pay for them is because the value they are getting from them in return is higher than the value of the cash they pay for them. In an ideal world, every product would be created in a way that benefits both the seller and the buyer.

In reality, the product creation is oftentimes done wrongly with disastrous results, especially in risk-averse companies. The product ideas often come from the high management, because they are the ones actually defining what the company does and everybody else just follows. The designers and developers then execute the waterfall product plan or a roadmap the management has put together and the salespeople then try to sell it. The main problem in this approach is the lack of product validation. Developing any product requires investing an enormous amount of resources, so it is very desirable to mitigate the risk of building a product that is of no value to its intended customers. In other words, *"it doesn't matter how good your engineering team is if they are not given something worthwhile to build"* [1].

That is where the product management comes in. A product manager is, in theory, someone who leads the product team to solve real customer problems by combining design and technology in a way that also benefits the company's business [2]. This person is responsible for the product's success during all the lifecycle stages of it. Making sure the product succeeds requires a constant understanding of the situation and the ability to choose the right approach for it.

Depending on the company's size, industry and needs, product management can take up various forms. This thesis will focus on the product management in small startups delivering innovative B2B products. A product manager in such company usually not only takes up the usual PM's duties,

but also takes care of overseeing either the design or the engineering. Incidentally, I will be taking up the role of a PM along with my already established role of a Product Designer in DataBreakers for the purposes of his thesis.

1.2 Similar roles

Even though the term Product Manager can be considered an industry standard and its meaning is generally known, there are some similar roles with similar titles. Moreover, some companies adopt their own terminology and others merge roles as needed. To avoid any confusion, it is necessary to clearly define the meaning of each title, as they will be constantly used throughout the text of this thesis.

1.2.1 Product Owner

A product owner is a SCRUM role that takes care of a subset of product manager's responsibilities in greater granularity. This person makes sure that the work is prioritized and that the development team sticks to the product vision. This role can be merged with the product manager, especially in smaller startups.

1.2.2 Product Designer

A product designer is a person who is mainly focused on the user-facing part of the product. They work on user flows and prototypes, but also on visuals and presentations. This person should be closely collaborating with the product manager (ideally, they should be sitting next to each other), but these roles should be separated, since both roles are extremely demanding in terms of time.

1.2.3 Project Manager

A project manager is a person who mainly oversees the execution of a project, meaning that they manage the quality, scope, time and cost. They are usually making sure that the product is being built by the right people with the right information, but are not involved in the pursuit of the right product.

1.2.4 CEO

A chief executive officer is a person in charge of a given company and therefore on top of the hierarchy, unlike the product manager, who is merely a standalone team member. A CEO can fill the role of a product manager, especially in early-stage startups or in small companies with a simple product.

1.3 Responsibilities and goals

According to Marty Cagan, the role of a product manager consists of a myriad small things that are influenced by the company, product and the industry, but the key principles should always stay the same. The key takeaways from the book will follow.

The product manager's first and foremost responsibility is to have deep and up-to-date knowledge of the customer, the data, the business and the market. They should actually strive to become the company's go-to expert on these topics and share the knowledge liberally.

It is also extremely important to fall in love with the problem, not the solution we have on our mind or the one we have already built. This is because the actual problem is set in stone and needs solving; the solution we currently have might not be the best one there is and we need to be able throw it away in favor of a new one.

The new product or feature ideas needs to be validated early and often and the product manager should strongly enforce this approach. This is achievable by rapidly creating and testing prototypes focused on the one thing that needs to be validated. The form, fidelity and the "realness" of the prototype depends on what exactly needs to be validated, however, it should always take the smallest possible amount of resources to create the prototype.

In the case of an already functional product, the product manager should enforce consistent innovation, striving to develop the product to its full potential. The constant validation approach should never really go away — being a product manager of a product in it's later lifecycle stage should be all about pushing the product even further, utilizing many of the methods used early in the lifecycle. Sometimes, a critical change or even a product pivoting is necessary. If this is the case, the PM's main responsibility is getting enough data to confidently drive the change and to be the first and foremost evangelist towards their own team and stakeholders.

Even though the product manager should stay on top of things all the time, it's important for the team to have the mindset of missionaries, not mercenaries. In other words, it is the product manager's job to ensure that the product team feels empowered, that their creativity is put to a good use and that they are trusted by the higher management to actually find the solution to the problem. The product team should be told what to do and why, but never how to do it.

1.4 Real world examples

To draw knowledge not only from books, but also from real-world examples, I talked to or studied several product managers, of which I picked 3 with very

different approaches. I anonymized the first two names so that their complete point of view can be published.

1.4.1 PM 1

This person has worked as a product manager for a B2B company startup and is currently a CEO of their own digital agency. Their main point was that people have to absolutely trust the product manager regardless of the situation. They often need to make decisions in seconds and present them to the team in a convincing manner. When asked about a specific process for introducing a new product or a feature of value, they dismissed the idea, saying that there was no such thing. They believe strongly that it is possible to power through with the product, that one is able to actually convince both the team and the customers that the product is an amazing thing even if it is not.

1.4.2 PM 2

I contacted this person, actually a product designer, trying to get access to their product manager. The startup they work for is an established B2B/B2C company with the employee number close to 50, so I assumed that there would be at least one dedicated PM. However, it seems that this company is doing just fine without one — the CEO and COO communicate the product vision directly to the team leaders, who are responsible for their own small teams and solve problems with each other. What is more, it seems that the product management role here is being shared by the CEO, COO and the product designer, who, apart from being the main product designer, is well-versed regarding the product data, has a clear vision of where the website and the product should go next and is so keen on the company's product that he is of naturally taking up the role an evangelist.

1.4.3 Jan Černý

Jan is the CTO of DataBreakers and currently fulfills the role of a product manager as well. His (and therefore DataBreakers') approach to product creation is similar to Marty Cagan's regarding the principles, but he was also able to disclose much more about the actual processes and methods he uses, which are extremely relevant to this thesis.

For example, he validates product ideas by presenting them as existing products when onboarding a new customer. If he gets a positive reaction such as an inquiring question or even a request for the product idea to be implemented, he notes it and tries to validate the idea with more customers to see if there is a general interest in it. If there is enough customers who are interested in this, he proceeds to a pilot test to validate the results of

the product. This is specific to data-driven products, especially the ones that need inputs from people to actually work — the product manager is unable to theoretically gauge the effectivity of the tool; it needs to be tested in the field. Because of that, the pilot is usually done in a pragmatic way, meaning that reusability and robustness are given up in favor of quick deployment. The performance of the product is then measured and the product is tweaked based on the results. After proving (with an A/B test) that the solution works as intended, it can applied to other scenarios.

Another valuable piece of information was the fact that DataBreaker's products were always customer-driven, meaning that the product was always initially aimed at a concrete customer's problem. However, what Jan stated as extremely important was the fact that the final solution was always focused on the core of the problem and was abstract enough to be applicable to other customers' similar problems.

The idea for this product came from this exact scenario. It has been mentioned in various forms to several customers who expressed interest and afterwards moulded into one universal concept, that is going to be, in some form applicable to a wide array of customer problems.

1.5 Databreakers - what do they expect: new products and day to day life

I met Jan to talk about what they expect from their product managers. DataBreakers is currently at the brink of hiring one; even though that Jan (CTO) and Nikol (CEO) are not planning on completely giving up the PM responsibilities, the lack of a dedicated PM is getting in the way of scaling the company up. This person would join Jan and Nikol in running the day-to-day activities such as customer communication, data analytics, quality control and evangelizing both inward and outward the company. After learning the ropes, the PM would be assigned their own product or products and given more freedom.

Jan's vision of a product manager overlaps with Marty Cagan's. He thinks that the product manager should be the person who is going for the details only when necessary and should be focusing on the big picture. The PM should be constantly making sure that what the team is building is something of value to both the customers and the business. On the other hand, the PM should have some experience with development and design as well to be able to relate to the product team and understand their issues and suggestions. The PM should also be the main evangelist, a person who spreads and improves the product vision as they breathe. They need to be a source of inspiration and motivation to their team. Another important aspect is being able to do quality control. Even though the product team is composed of competent people, things slip and there needs be someone who makes sure that everything

that goes to production or to the customers is done exactly as it needs to be done.

We also talked about the ideal PMs personality and attitude. Jan actually identified the person's attitude as one of the crucial things he looks for in people. They should have a productive approach to work, meaning that they are set on getting stuff done. It doesn't matter whether they delegate, outsource or do the tasks themselves, Jan needs to be sure that once the PM gets assigned some work, the work will be done. They should also be self-starters, meaning that when they see what needs doing, they will start working on it, instead of waiting for orders. Personality matters, too; the PM should be able to connect with people easily, be empathetic and easy-going, but they should never slip into not taking their work, team or customers seriously.

To sum up, the ideal product manager for DataBreakers should be a mature person who lives and breathes the product vision. They should be doing everything that needs to be done to ensure the product's success and not be afraid to take responsibility for it.

1.6 Product creation process

The product (its working MVP) I'll be working on is going to be created from scratch. The potential customers and the machine learning model used for the predictions are going to be provided by DataBreakers, but apart from that, everything else will need to be done by me. Therefore, the process that is going to be used will be attuned to creation and rapid prototyping, with the goal of getting the MVP to the market as soon as possible. The product managerial approach to continuous product improvement and reaching its potential will be mentioned in the 'Future' chapter.

For the sake of this thesis, I will not only take on the role of the product manager, but also the one of the product designer and partly the developer.

1.6.1 Product vision and strategy

Hoa Loranger in [3] argues that one of the biggest mistakes made when creating products is focusing on what to build before defining its purpose.

Product vision should be the cornerstone of each product. *"A great vision is the short, clear description of what value the company will deliver to its customers both now and in the future"* [4]. Depending on the company, the vision should light the way for the next two to ten years and should be abstract enough not to dictate how exactly something should be built.

It may take several iterations to come up with a straightforward, compelling and adequately ambitious product vision, but when one does, it should be driving the product decisions. The product manager should be the one spreading the vision within the company, making sure that it is on everyone's mind when working on the product. In this case, the vision has been vaguely

defined by DataBreakers already and the task at hand is to put it into exact words.

"The product strategy is a more concrete specification. The product strategy is our sequence of products or releases we plan to deliver on the path to realizing the product vision" [5]. In the case of this product, it is going to be a loose plan of releases specifying the steps from the MVP to the full potential of the product realized. Even though the product strategy addresses very exact points and features, it should not be trusted blindly and can be adjusted if the data suggest that it would benefit the product to do so.

1.6.2 Knowledge gathering

As has been previously mentioned, the product manager should become a go-to expert on the topics of the market, customers, business and data. This is important because it allows them to make decisions based on relevant facts and plan for the future based on real information.

For this thesis, I am going to research the market, alternative solutions, competition and I'll also try to pinpoint the industry leaders. After that, I am going to talk to the potential customers to learn more about their pains, desires and expectations. I will broaden my understanding of DataBreakers' business, such as the constraints they operate under and how do the stakeholders envision the company's future. As for the data, it will be included where relevant.

1.6.3 Product testing and prototyping

After gathering all the data necessary to start this phase, I will firstly address the value viability of the product. The fact that several DataBreakers' customers showed interest in this product indicates that there seems to be some value, but it is necessary to find the real MVP from the value point of view. This will be done both qualitatively and quantitatively.

To do so quantitatively, a so-called landing page test will be performed. A landing page will be created and ran live, supported by marketing, just like it would be if the product was real. It will describe the product's capabilities and will try to convert the user into a customer. After the user agrees to use the product, they will be told that DataBreakers is currently just testing the demand for the product and they can join the closed alpha testing of the product. This way, we can establish a tight relationship with new potential customers. User behavior will be monitored and two versions of the product will be offered and tested against each other to determine which features and functionalities are the most important for potential customers.

For a qualitative test, interviews with potential customers will be performed to gather feedback. This will also open doors to partnering up with a customer to actually develop the product. I will talk to all the acquired

potential customers to expand my knowledge of their problems even further and will keep consulting them on every step of the way. I will meet with the potential clients to talk about personalization in general, ask about their business problems and see if any of those could be solved by this product. The goal is to establish a relationship where a company is willing to pay a rather small amount of money in return for us developing this product for them. This is a great thing for two reasons: for one, a part of the development costs will be covered and two, a customer actually willing to pay for something that is not even out there yet is a strong indicator of value. And even if the client is not interested in this solution for now, they will provide a lot of valuable information we can act on later.

After I am sure that the set of the MVP functionalities and features has been selected properly, a feasibility prototype and testing will follow. This kind of a prototype is constructed to make sure we can actually build the ideal solution. The personalization script will be built to check whether we can actually personalize the website in real-time without the website visitor noticing the delay. This script will not attempt to emulate the real MVP solution, rather, it will be built to test the speed only and will not cover other essential factors such as robustness, security or scalability.

Lastly, the business viability will be checked. The product needs to fit with the rest of the DataBreakers' product portfolio and needs to be monetized in a sustainable way. For this test, the product will be discussed with DataBreakers CEO and CTO to make sure it is on the right track business-wise.

1.6.4 Product design

This section will define the product in greater detail. Key requirements and priorities will be defines. All the features and functionalities will be listed and explained. How the product actually works will be depicted on schemas and diagrams of various fidelity.

1.6.5 Business model and monetization

Lastly, the monetization of the product will be discussed.

Chapter 2

Realisation

2.1 Product vision and strategy

2.1.1 Product vision

The first iteration of the vision Jan and I came up with is:

We believe that the web-browsing should be a personalized experience. We want to provide the website owners with an accessible way to automagically adjust the website for each separate individual. The personalization should always benefit both parties, the website provider and the website user alike.

While it was a good start, we felt that it didn't feel compelling enough to immediately grab everyone's attention and the terminology was a little bit dull, too. After several iteration, playing with the synonyms and prioritizing, we ended up with:

We believe that the web-browsing should be a personalized experience. The data-driven model constructing the website in real-time will predict what the user is looking for and serve it where they are going to be looking for it in a way that will appeal to them. To fully allow this, we must change not only the way the websites are presented, but also the way they are built. We think that it is time to change the web, which has been the same since it was created. Not just adjust, change.

2.1.2 Product principles

We came up with a set of product principles that will help guide the decisions and keep the product on track to what we aim to build.

Never bother the customer. To implement the solution, the customer should just paste one line of code to their website and they should never have to touch it again.

Provide fast and consistent experience for the website visitor. The website visitor should never notice any delay or inconsistency caused by our product, even if our servers go offline.

Develop with the big picture in mind. The implementation should be easily scalable to accommodate new features and functionalities.

2.1.3 Product strategy

Currently, we strongly feel that this vision should be fulfilled by a single product. The MVP release should be technologically simple to allow for fast adjusting and experimenting with the product. At first, we expect to create a simple mechanism that will be handled manually and will need to be customized for each customer. However, even the first version should be capable of A/B testing and advanced measuring of results. The next few releases will expand the capabilities of the mechanism, meaning gradually being able to personalize more elements and whole sections of the site. This first version will be primarily aimed at big corporate customers, who can afford to pay for a tailored solution and are open to communicating with us regarding the product.

After covering the personalization abilities, we will tackle the customer experience. A customer-facing management interface for the product will be built, allowing the customers to edit the personalization options, analyze the data and configure the algorithms within the given restrictions. This will place a lot of control into the hands of customers and therefore will unburden the DataBreakers team from having to act on every little customer change request. This will make the product more approachable for small and medium-sized companies, who often rather take care of some things themselves when it saves them money. This comes at a cost of creating and sustaining a customer-facing tool.

After this, the final big functionality will be added: the ability to set up the personalization system by the customer alone. This will open up the product to everyone. These customers will pay substantially less for the product than the big companies, but the number of them will be several orders of magnitude bigger. However, this will also require a large investment into the development of the interface, extended support and educational materials.

2.2 Knowledge gathering

2.2.1 Market

Even though the real-time personalization is not as widespread as other optimization techniques such as product recommendation, A/B testing or remarketing, the articles popping all over the internet hint that it may become the next big thing. For example, an article [6] originally published on Teradata's blog that has been republished on Forbes, says this: *"In order to maintain your competitive edge, you're going to need to use all the data that's available to create interactions that are relevant and valuable to your customers. When the customer, brand and marketer are aligned, the customer experience is optimized, and you can move far beyond mere personalization to true individualization"*. Overall, the current market mood is set to explore and try out this technology. Only around 20 % of companies are currently not thinking about personalization [7].

An interesting fact to note is that companies providing the web personalization are almost exclusively marketing companies and the web personalization is usually just one of the many services they offer.

2.2.2 Alternative solutions

2.2.2.1 A/B testing

"A/B testing splits live traffic into two (or more) parts: most users see the standard design ("A"), but a small percentage sees an alternative design ("B"). After collecting statistically significant numbers, the design with the best KPI (key performance indicator, such as conversion or bounce rates) becomes the new standard. (One can test more than 2 design variations at a time through a related method called multivariant testing)" [8].

Therefore, it can be perceived as a sort of personalization in a way that it chooses the better performing variation and shows it to all the users. This is an improvement for the majority of the target audience, but is not be beneficial for everyone. Also, it is customary that only one element of the website gets A/B tested, so the change for the better happens slowly.

2.2.2.2 Separate landing pages

"In digital marketing, a landing page is a standalone web page, created specifically for the purposes of a marketing or advertising campaign. It's where a visitor "lands" when they have clicked on a Google AdWords ad or similar" [9].

The personalization here happens when the user interacts with the given ad. By doing so, they indicate interest in the specific topic and the following

landing page's content can be tailored for a well defined persona — the kind of person that is clicking that kind of an ad.

2.2.2.3 Rule-based personalization

"The closest solution to the one this thesis is pursuing is a so-called rule-based personalization, which allows marketers to deliver experiences to specific groups or segments of people based on the manual creation and manipulation of business rules" [10].

These rules are based on specific user attributes such as location, local time or an OS type.

The results from Optimizely's experiment with a homepage personalized this way hint at the success of this method: *"Let's start with the qualitative data. In short, people loved the new homepage. They even tweeted about it and sent emails to our team. If your homepage design is worth tweeting about, that's either a fantastic or a horrible sign. We were glad that it was all positive sentiment. Quantitatively, the new individualized homepage experience performed better than the original" [11].*

2.2.3 Competitors

There are countless marketing companies offering web personalization as one of their services, but after a closer look, what they are usually doing is elements recommendation and small personalization in forms of banners or popovers.

These companies will not have the competitive advantage over our product, however, their customers are probably using their personalization services in a bundle with other ones. Therefore, it is important to not only be slightly better than their solution, but to offer a service so valuable that it is worth cancelling an existing contract for.

From DataBreakers' experience, with most of the competitors, that is not such a difficult thing to do. The sad fact about today's market is that even though customers are using prediction software and automatized solutions to do a lot of things, they oftentimes do not have any idea about what is really going on. The solutions are often run, but not measured.

However, there are some noteworthy competitors who are doing exactly what we would like to. One of them is Optimizely (`https://www.optimizely.com/products/personalization/`), which covers a lot of ground regarding the functionalities we'd like to have, except the focus on machine learning instead of a rule-based system. Moreover, their product seems very inaccessible to medium and small businesses. Google Analytics Optimize (`https://www.google.com/analytics/optimize/features/`) is another similar product and it is integrated with Google Analytics, which is the industry standard for any web analytics. This provides a very strong position on the mar-

ket. Lastly, Adobe Target (`https://www.adobe.com/uk/marketing-cloud/target.html`) is another huge name in the industry.

Over all, the competition in this market is pretty strong. However, our competitive advantage could be the fact, that we will do a few things extremely well, instead of doing everything. Jason Fried thinks similarly in Rework:

"Do less than your competitors to beat them. Solve the simple problems and leave the hairy, difficult, nasty problems to the competition. (...) Don't shy away from the fact that your product or service does less. Highlight it. Be proud of it. Sell it as aggressively as competitors sell their extensive feature lists" [12].

Another advantage is our transparency, the fact that we measure and report real results.

2.2.4 Customer

To judge whether our potential customers want to use a solution like this, we need to find out whether the customers of our customers are interested in personalized experience. Fortunately, the data says yes:

- *"74% of customers feel frustrated when website content is not personalized"* [13]
- *"63% of respondents are highly annoyed by the way brands continue to rely on the old-fashioned strategy of blasting generic ad messages repeatedly"* [14]
- *"63% of consumers said they'd think more positively of a brand if it gave them content that was more valuable, interesting or relevant"* [15]

However, since we are coming to the market with a very lean MVP, it is not sufficient to say that the potential customers will want it. The array of potential customers needs to be narrowed down to a small subset that will share a very similar, well-defined problem. This way, our solution could be initially applied exclusively to this problem and wouldn't require them to cancel their current contracts, which is something they might be worried about.

One group of customers might be platforms that need to convince two vastly different target groups to use them. An example would be Airbnb, a company which needs to talk to their hosts almost as much as to their renters, or Mintos, a P2P lending platform that needs to appear forthcoming to both the investors and the borrowers. Platforms like these would probably benefit immensely from not having to focus the content on the homepage for just one of their target groups. Another, much bigger group is those companies that

need to alter their website messaging based on multiple campaigns they are currently running or to various target groups that visit the website.

Based on DataBreakers' experience, there is one concern an overwhelming majority of companies interested in machine learning personalization share. They were trying some kind of a real-time website personalization at some point in time and it didn't work as well. In the better case, it didn't work at all, the worst case was that it actually hurt the performance of the website. This product will need to be presented in a way that makes it clear that it actually works and does not introduce delays or other hiccups. This applies not only to direct-to-customer presentations, but also to the product's landing page itself. Moreover, they indirectly confirmed that in case they are already using a personalization product, they are much less likely to try on a new one, even if the old one does not work. Another valuable piece of information is that the big corporations usually have a lot of regulations in place and cannot start using a new solution on a whim. The people I or DataBreakers talked to either needed an approval from several people higher in hierarchy or were forced to use a solution that is used by the rest of the company. These rules can be overcome, bended or bypassed, but people would go such lengths only for a product that would surely be worth it.

2.2.5 Business

DataBreakers currently work with 3 main products, all of them based on data-driven predictions. The Promoter is a an automated solution for Facebook ad campaigns, automatically adjusting the budget, spending speed, target audiences and much more to optimize the conversions their customer gets from a campaign. The Recommender is a products or content recommendation tool that predicts what the user wants to buy. Lastly, the DataBreaker is a universal prediction engine that can be tailored to the customer's needs. Among other confidential things, it is currently also used for financial scoring and customer retention. The goal for the DataBreaker is to be enable a data-driven company — a company that would see the future and make all its decisions based on predictions.

DataBreakers' customers often come looking for one solution and end up getting a package of products because needing predictions in one part of their business usually means needing it in others, too. Both Jan and Nikol are saying that this is probably not going to change anytime soon and are planning to create a portfolio of products that can work standalone, but also allow serializing and bundling. An example would be a marketing messages creator that could be used on its own to help brainstorm messages, but its outputs could also be automatically used by the Promoter to optimize campaign results. Or, this personalization solution could be further utilized by the DataBreaker for creating various landing pages that would be sent to individuals based on their predicted actions in the near future.

Therefore, it is important that the product has value on its own, but also is able to accept inputs from and generate outputs for other products. This does not need to be implemented in the MVP, but it should be thought of when working on the product in the future.

When I asked about constraints, I was told that there were not many. Of course, there are some things that are set in stone, but the DataBreakers team is currently in the phase where they are willing to take risks by building products that are not only slightly better at something, but have a chance to be substantially better than everything that is out there. They are pursuing the vision saying that real numbers are real results and they believe that they can draw a tremendous amount of knowledge from this kind of data alone.

2.3 Product discovery

2.3.1 The landing page test

For purely practical reasons, the first test that is going to be executed is the quantitative value test, which is the landing page test. This is because the longer the page is up, the more data we can gather and the data is what we are after. In the real world, or at least in a bigger company, the product designer should be responsible for creating the landing page and the product manager should be paying close attention to the data, communicating the progress to the rest of the team and the management and adjusting the plan for the next prototypes based on the data and feedback. For this thesis, I will take on the role of the product designer, will create the variations of the landing page and will run it live with all the analytics in place.

The landing page will start with a short and abstract description of what the product is, continue with the list of capabilities and end with a conversion attempt. The list of capabilities is what is really being tested here. We will measure which set of capabilities has brought the biggest % of conversions and based on that, we will decide which features should be in the MVP.

The visual of the landing page will be created in Sketch and will be compliant with DataBreakers' visual style to help with the credibility. On the other hand, unlike the design of the DataBreakers' main site, the design of the landing page will be strongly focused on conversions, since we need to get as many of them as possible.

2.3.1.1 Wireframe

A wireframe shown on figures 21 and 22 was created to quickly check the content and form with DataBreakers. The first version places importance on personalizing for multiple user groups at the same time. This is the direction we expect the MVP go in, but only the test will reveal whether the potential customers think so too.

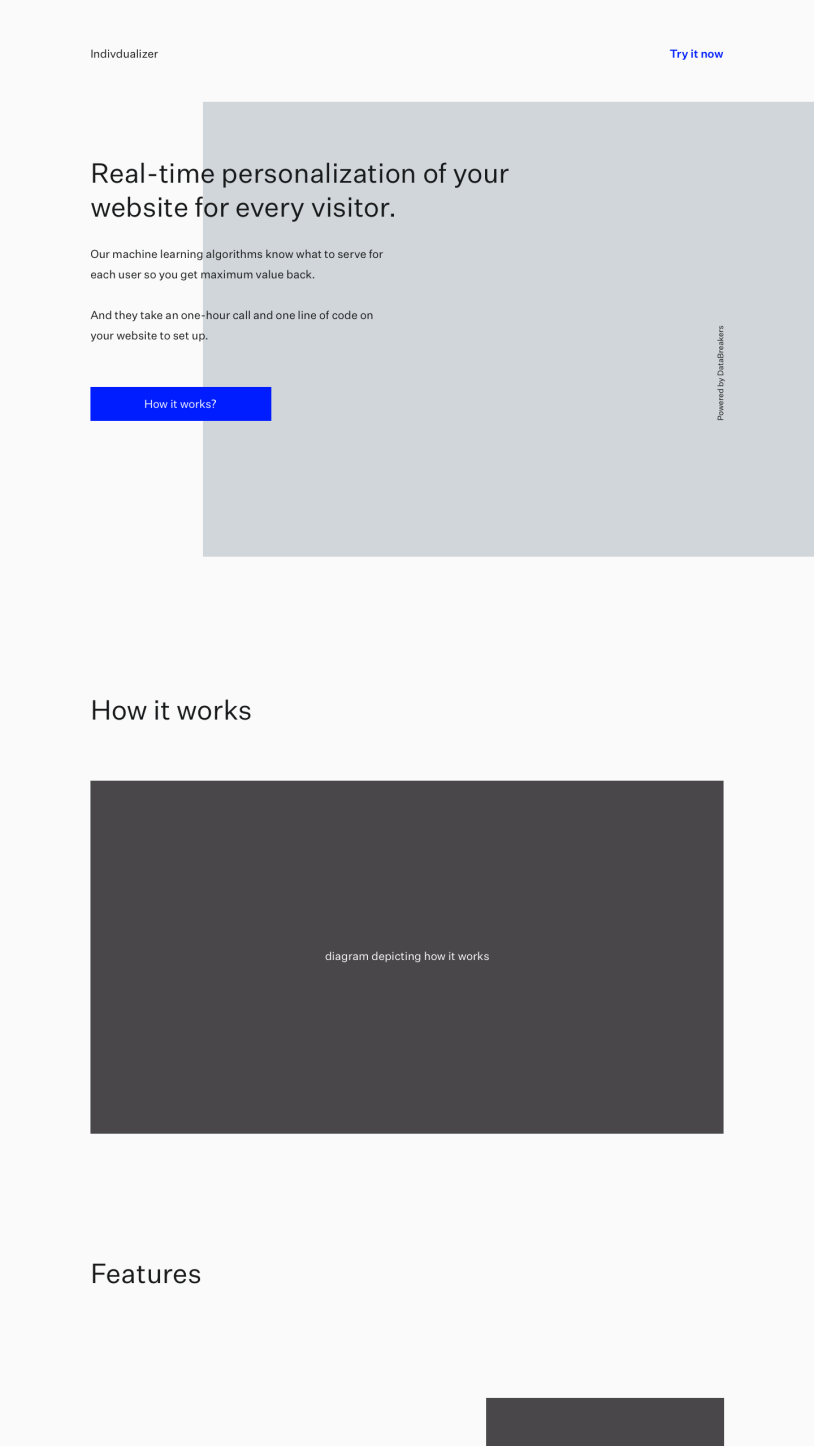

Figure 21: Landing page wireframe part 1

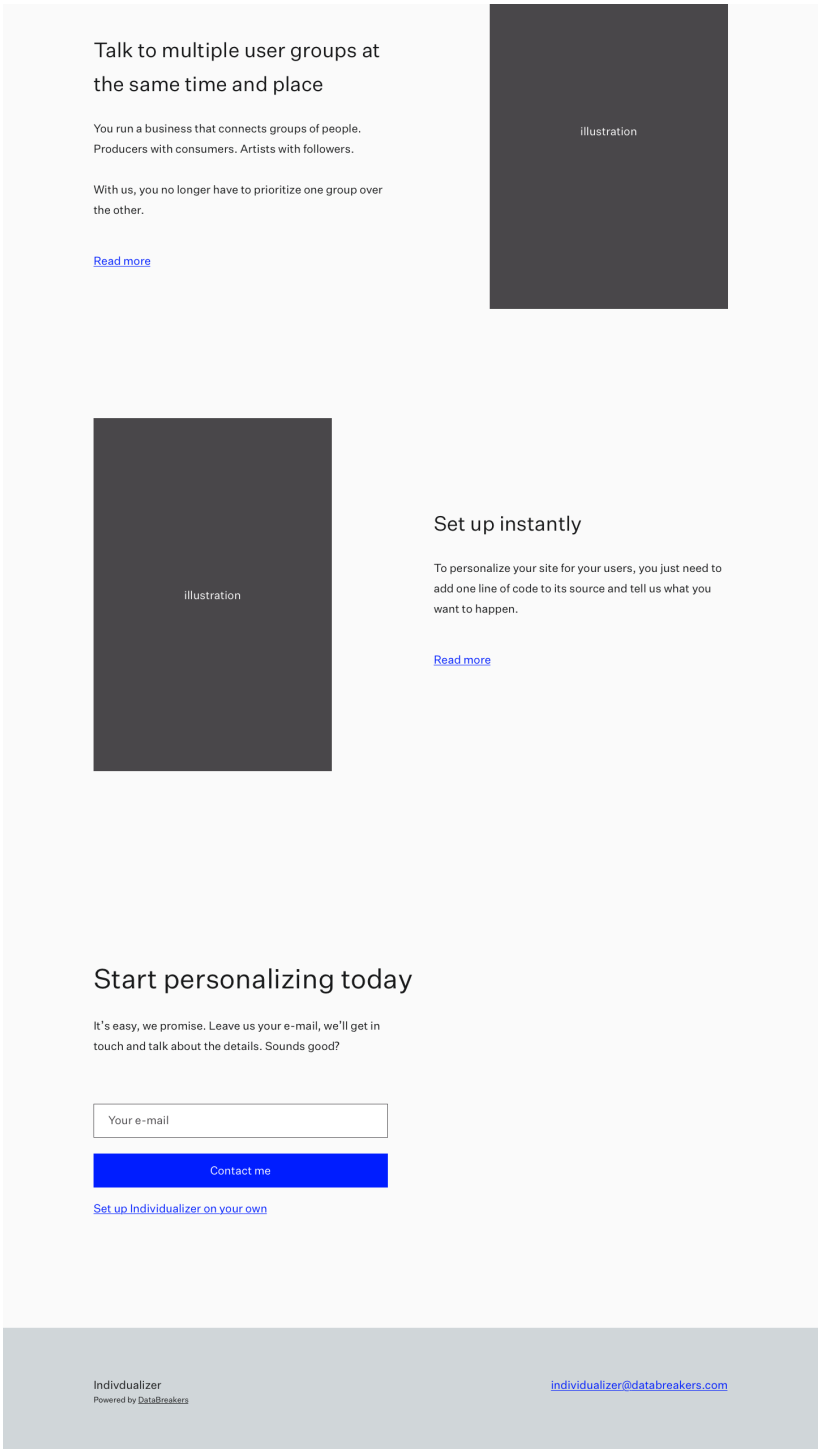

Figure 22: Landing page wireframe part 2

2.3.1.2 Visual

I, taking up the role of a product designer, created the visual design for the landing page, partly shown on figures 24, 25 and 26. The design was kept as simple and easy-to-code as possible because there is no point investing a big amount of resources into something that might get thrown away in a few days. I hired a graphic designer to create illustrations that help the visitors understand the concepts presented. There were two rounds of feedback until I was satisfied with the result, but it was fast and went smoothly. To help the illustrator understand what I want, I roughly sketched the idea of every illustration that was planned for the landing page, one example can be found on 23. Things like adjusting the illustrations until they explain the product well might not be the everyday work of a product manager, but it is a great example of "doing everything that needs to be done so that the product is successful".

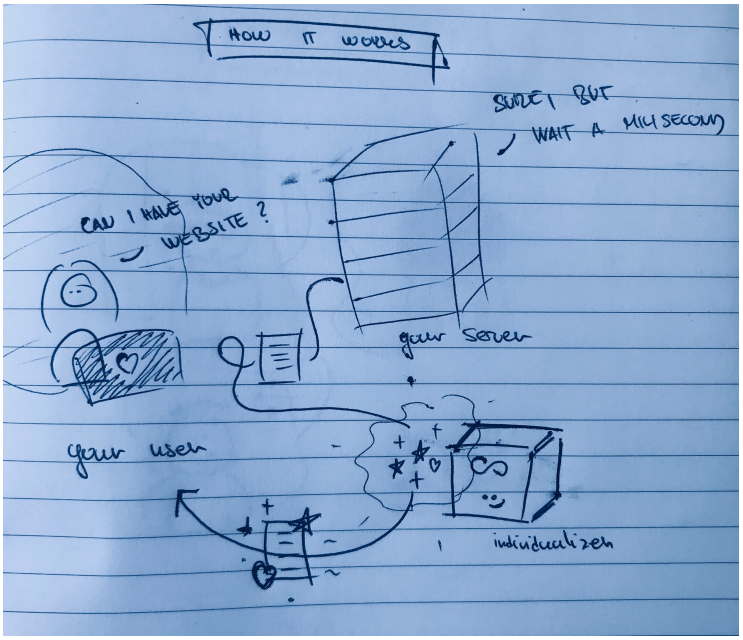

Figure 23: Sketch for the illustrator

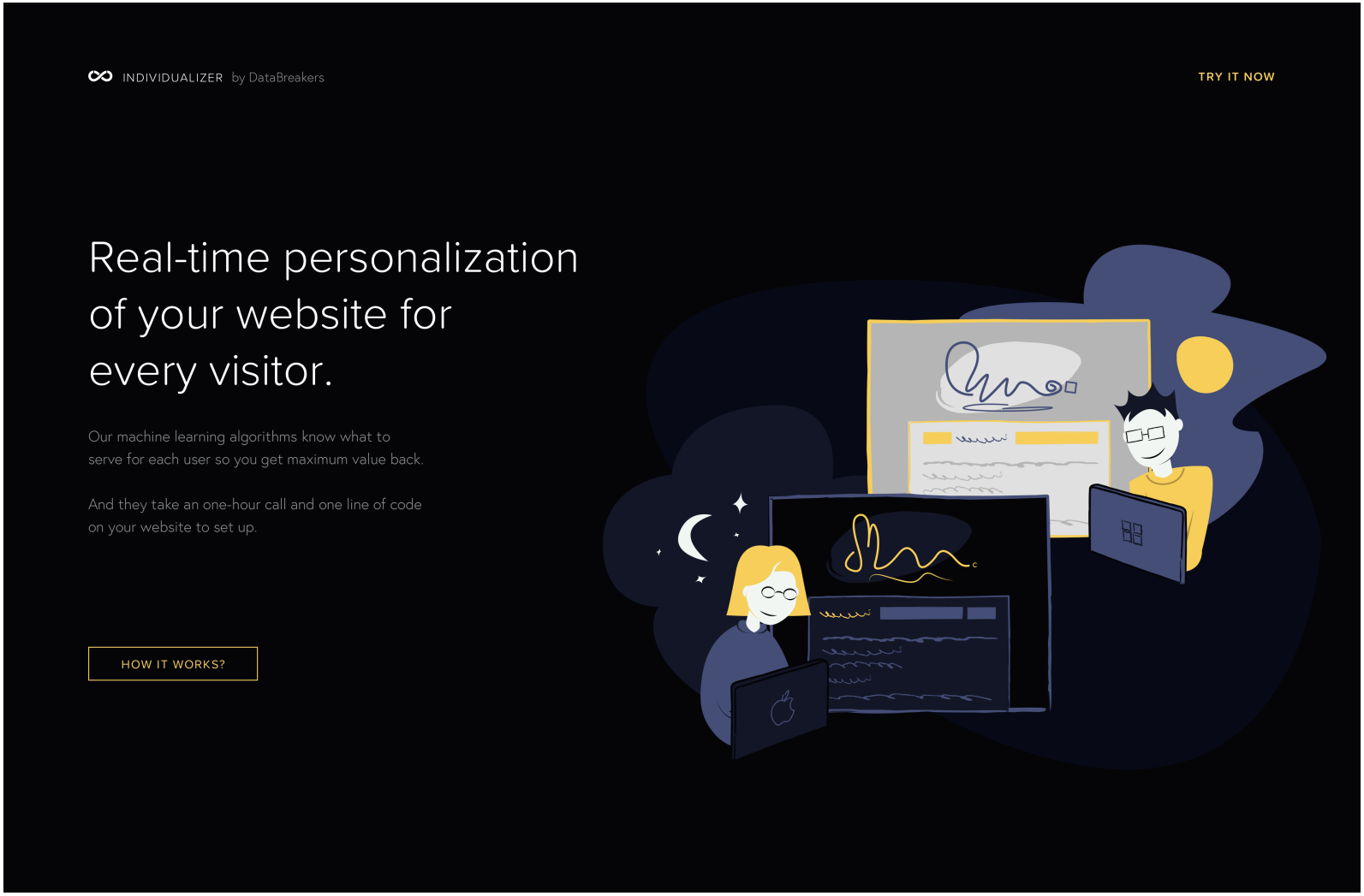

Figure 24: Landing page design part 1

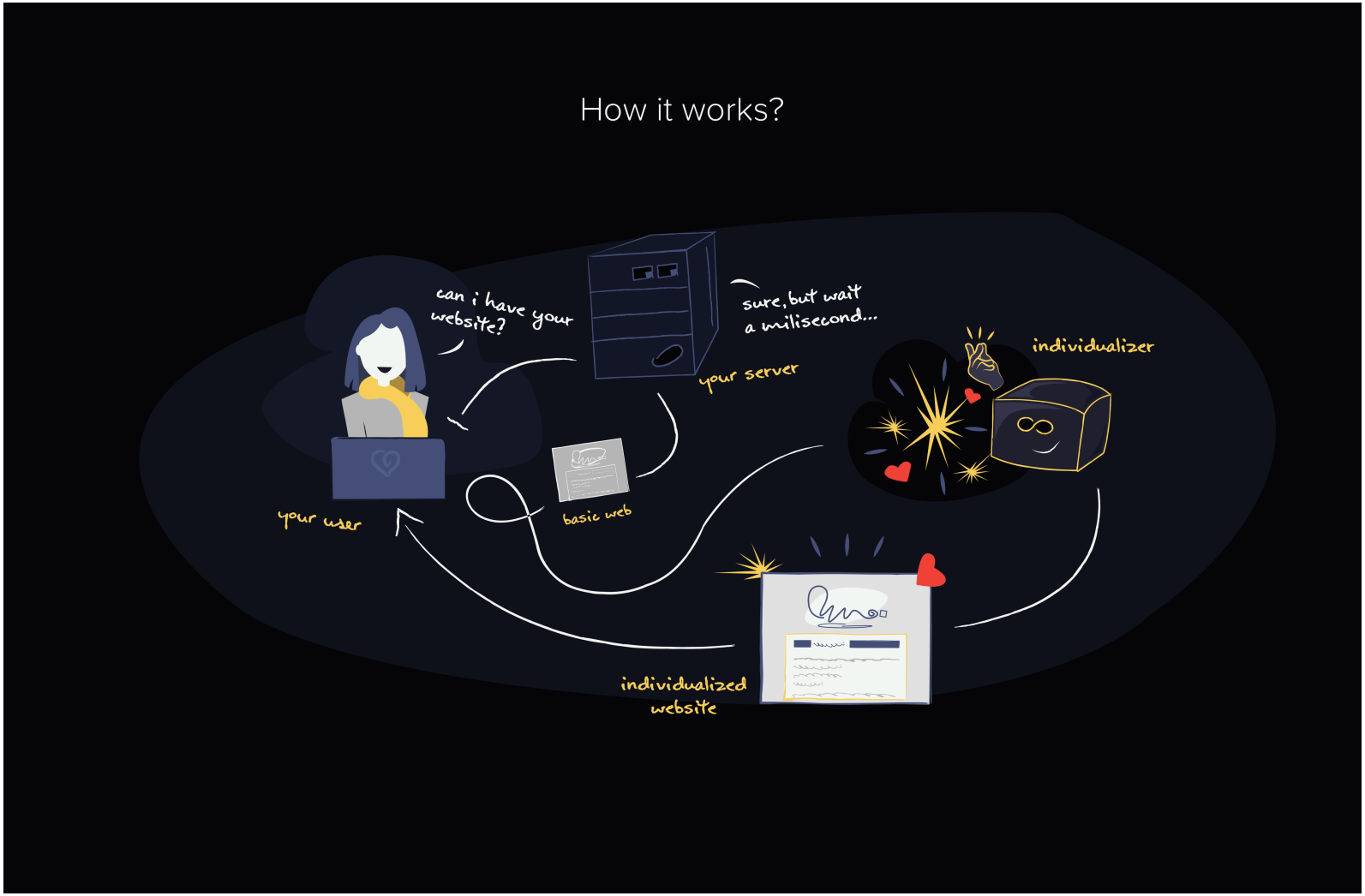

Figure 25: Landing page design part 2

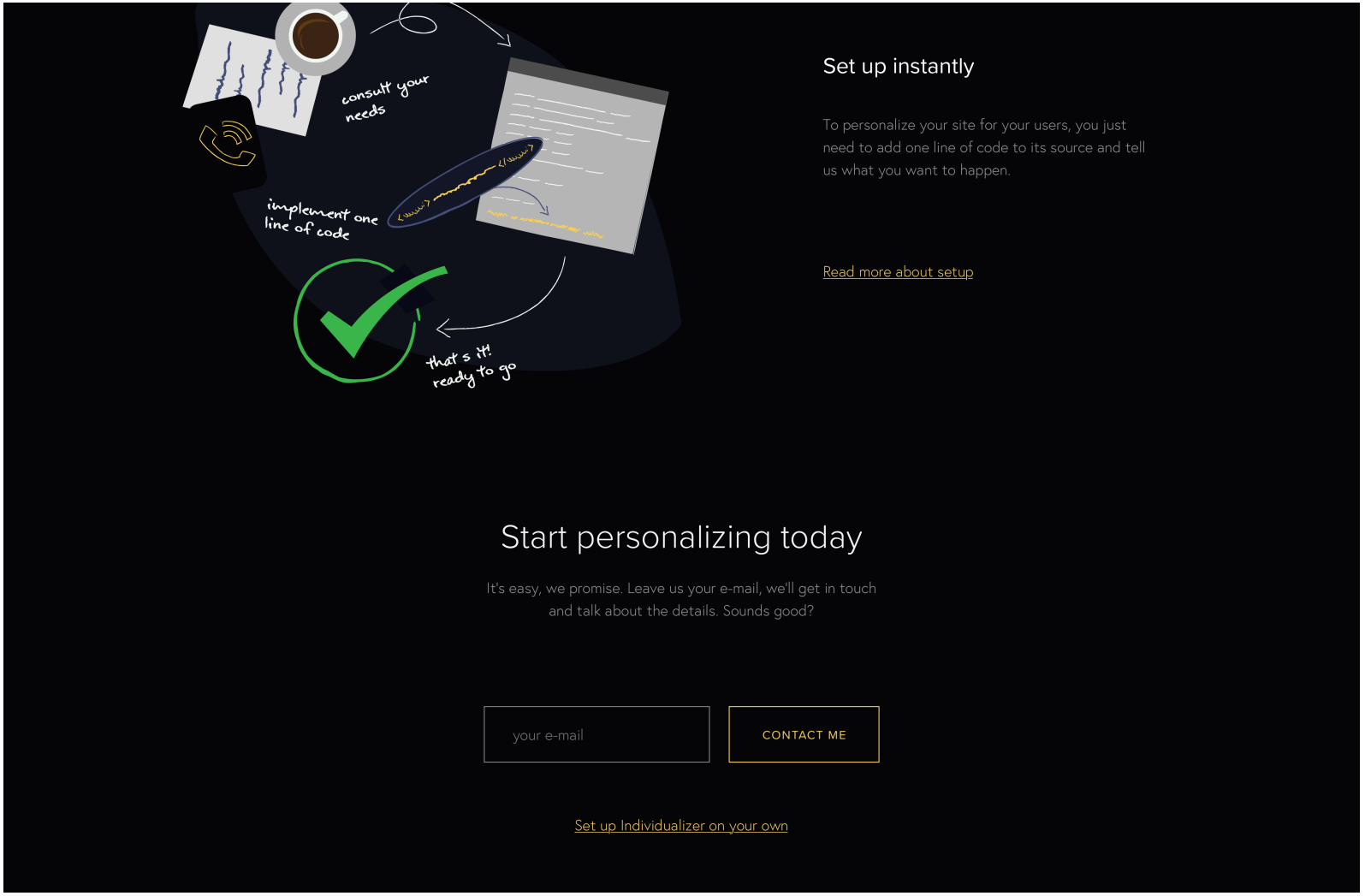

Figure 26: Landing page design part 3

2.3.1.3 Execution

After having completed the landing page design, I asked the DataBreakers' front-end developer Lukas to code it as soon as possible. The landing page will be be hosted on www.databreakers.com/individualizer to benefit from the DataBreakers' name. Firstly, just having the company name in the URL helps with credibility and according to moz.com, it is likely to get better SEO ranking if it is presented as a subfolder of databreakers.com [16]. I also asked for Google Analytics and HotJar access.

Two versions of the website are ran; one offering "Speak to multiple user groups at the same time and place" as its main feature, other presenting "Individualize your website for every single user" as the prime message. The goal was to find out whether the customers are interested more in a solution that would cater to different groups of users or whether they are after true one-to-one individualization.

2.3.1.4 Results

The data flowing in from the different versions of the website show some general interest and a few visitors left an e-mail address in the form on the bottom of the page. However, there is not enough data yet to determine the preference for one or the other marketing message. For that reason and because the landing page was successful at getting clients interested, it will be kept live and used for further data gathering and experimentation.

2.3.2 Potential customers interviews

2.3.2.1 Customer A

The idea for this product has actually originated from this customer. They are in the P2P lending business and one of their biggest challenges is making sure that the ratio of investors to borrowers is always balanced. In case it was not, it would disappoint and almost surely turn away a large groups of users, who either did not get their loans funded or did not have any loans to invest into.

They are currently battling the scarcity of investors by creating a new website and running a marketing campaign aimed at the potential investors. They thought it would help converting visitors into investors if they were able to speak to them more directly than just by having a "want to invest?" button in the menu. That is why they opted for two tabs on the homepage: one showing a loan calculator, the other one showing an investment profit calculator. These elements are placed on a fullscreen background that can also be utilized to complete the feel of the website. The wireframe of the website can be found on the figure 27. This where our solution comes in: if we could pre-select the tab based on our assumption about the customer

and successfully identify the investors at least a fraction of the time, it would already be an improvement as opposed to not identifying them at all. We could also pick the background based on which campaign ad is the customer coming from.

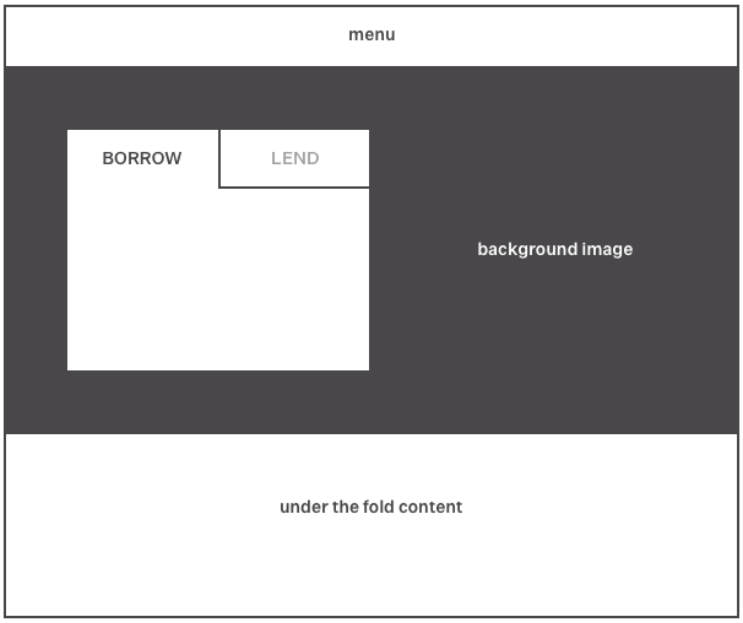

Figure 27: Wireframe of Customer A's website

This customer was interested in 3 applications of our product:

1. personalizing the above the fold area (the two calculator tabs and the background)
2. personalizing the below the fold area (the order and magnitude of information presented)
3. testing and personalizing the text on buttons throughout the site

We agreed to start working on the first one and after proving that it works, the other two will be added.

There was one issue we bumped into: how to measure the success of the solution? The users of this platform usually do not convert at the first contact

with the platform. However, that does not mean that the touchpoints they encounter along the way do not make a difference, but it is difficult to say what actually persuaded the visitor to sign up. We decided that because of this, we will do a fixed-price pilot and later implement a more powerful solution that will be able to track the customer's journey as a whole.

2.3.2.2 Customer B

I met up with a product designer from this company who personally handles everything about their website and most of the marketing. The company is both a B2C and B2B one oriented at AI image analysis, which makes them a good potential customer, since they already understand the concepts we are offering them. However, even with the knowledge of what is available to them, they are not using any personalization product neither for their marketing, nor their website. I found out that the biggest challenges they are facing currently are the improvement of marketing messaging and the marketing funnel.

Even though they said that the concept of Individualizer was "interesting" and that the personalization would definitely have value for the company, they were not keen on the pilot. This might be caused by the fact that they fall into the category of middle-to-small companies — those that would respond better to a solution with customer-facing interface that would allow them to set up the personalization on their own.

2.3.3 Feasibility prototype

The biggest concern this product was whether we can actually make changes to the website the customer loaded before they notice the delay. The load time average for the top 100 e-commerce websites in 2018 is 2.67s [17], paraphrase), but this is not the only number we should be paying attention to. Oftentimes a website is already partly displayed before it is fully loaded, so the ideal solution would be to make changes to the content before it is rendered. In that case, lower hundreds of milliseconds should not matter, but more than that is a no-go. To test this as fast as possible, I created a mockup covering both important sides of the solution: the user and the product API. The client server side was omitted as it had no real influence on this test result.

A simple HTML document containing a header and two tabs was created, mocking a website. In its default state, none of the tabs are selected. A screenshot of this website can be found on figure 28.

Figure 28: A screenshot of a mockup website before alteration

An important part of the HTML is actually a script placed as the first element, which is showcased in listing 2.1.

```
<script>
    var req = new XMLHttpRequest();
    req.open("POST", "http://demo7743942.mockable.io");
    req.send('*data placeholder*');

    document.addEventListener("DOMContentLoaded", function(event)
    {
        var body = document.getElementById("body");
        body.classList.add("hidden");
        req.onreadystatechange = function() {
            if (req.readyState == 4) {
                if (req.status == 200) {
                    eval(req.responseText);
                    body.classList.remove("hidden");
                }
            }
        };
    });
</script>
```

Listing 2.1: Feasibility test script

This script is fired immediately and executed synchronously. As a first thing, it sends a XMLHttpRequest to the Individualizer API, posting the user data and awaiting a response, the javascript code which alters the final structure and look of the website. After the construction of the DOM, it hides the whole website to prevent showing an unaltered website first. After the received changes are executed or the connection times out, it reveals the whole website to the user.

The product API was mocked using mockable.io. It always responded with the same response that was also testing the ways of changing the various properties of elements or even adding new ones, showcased in listing 2.2.

```
document.getElementById("h1").innerHTML = "This is <strong>still</
    strong> a website. Hi.";
document.getElementById("body").setAttribute("style", "background-
    color:black;color:white");
document.getElementById("Paris").style.display = "block";
document.getElementById("Paris-btn").className += " active";

var para = document.createElement("p");
var node = document.createTextNode("This is new.");
para.appendChild(node);

var element = document.getElementById("header");
var child = document.getElementById("aside");
element.insertBefore(para, child);
```

Listing 2.2: Mockup API answer

This solution has worked, producing an altered website shown on figure 29.

Figure 29: A screenshot of a mockup website after alteration

The performance results (shown on figure 210 were satisfactory. Not only running the script as soon as possible didn't introduce any noticeable delay except the network one, it also showed that the website rendering and waiting for the response can be executed at the same time. The rendering takes a minimal amount of time for this website, but will take a lot more for real customers' websites. The average rendering time I measured for airbnb.com and mintos.com was around 100 milliseconds. The more time the website rendering takes, the less delay is introduced by adding our personalization solution. It can be concluded that this solution is feasible.

Another part of the feasibility testing was making sure that DataBreakers' architecture can accommodate this solution or at least be relatively easy to adjust. I prepared a set of questions for Jan, who, as an acting CTO, was the best person to answer them:

Q: Do we have the skills on the team to build this?
Yes.

Q: Do we have enough time to build this?
Yes.

Q: Do we need any architectural changes to build this?

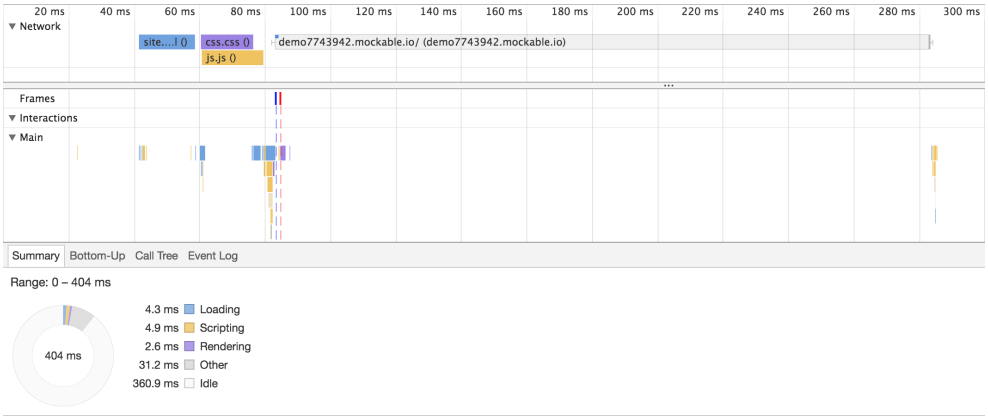

Figure 210: Website loading processes

Not really, maybe some small changes to the API, but it would be a general improvement for other products as well.

Q: Will it scale to the levels we need?
Technically, yes. Business-wise it is going to be more difficult, at least at the beginning, but we know about this and actually covered it well in the product strategy.

Q: Do we have the infrastructure necessary to test and run this?
Yes, our infrastructure has been designed to allow testing and running projects like this.

Q: Can we afford the cost to provision this?
Yes, the price of the MVP is quite low and if the product proves itself as viable, it should start at least covering its cots in no time.

These questions were taken from the book Inspired: How to create products people love [18].

2.3.4 Business viability

The last question to be answered is whether this product is worth investing resources into and whether it is legal and ethical to build it.

Regarding the investment itself, it is a no-brainer for DataBreakers. This product is actually going to utilize the recommendation model that is already built, which brings down the cost of the MVP by a great amount. The value to be gained back is massive: by offering both the Recommender and Individualizer, they will be able to cover full website personalization and recommendation for virtually any customer. Also, the experience gained from

the development and deployment of this product can be reused on the new ones.

A lot of companies had to change the way their solutions work due to the GDPR. Since this product will never store nor process any personal data as defined by the GDPR, we do not need to worry about it. The ethicality of the product may be questionable for some, since it uses other information that could be used to identify the individuals. Another issue might be similar to the recent problem with political ad campaigns very specifically targeting individuals and thus manipulating the results by telling people only what they wanted to hear instead of the whole truth.

2.4 Product design

With product discovery and prototyping already almost done, it is time to break down the product further.

2.4.1 How it works

The website is hosted on the customer's server, but the script included in the website code talks to the Individualizer API provided by DataBreakers. It means that the customer does not have to change anything regarding the way the website is hosted and DataBreakers do not have to care about anything except the script and the personalizing logic. Another advantage is that even in case of outage on DataBreakers' side, the website gets delivered to the user in its unaltered state. This high-level view is demonstrated on figure 211.

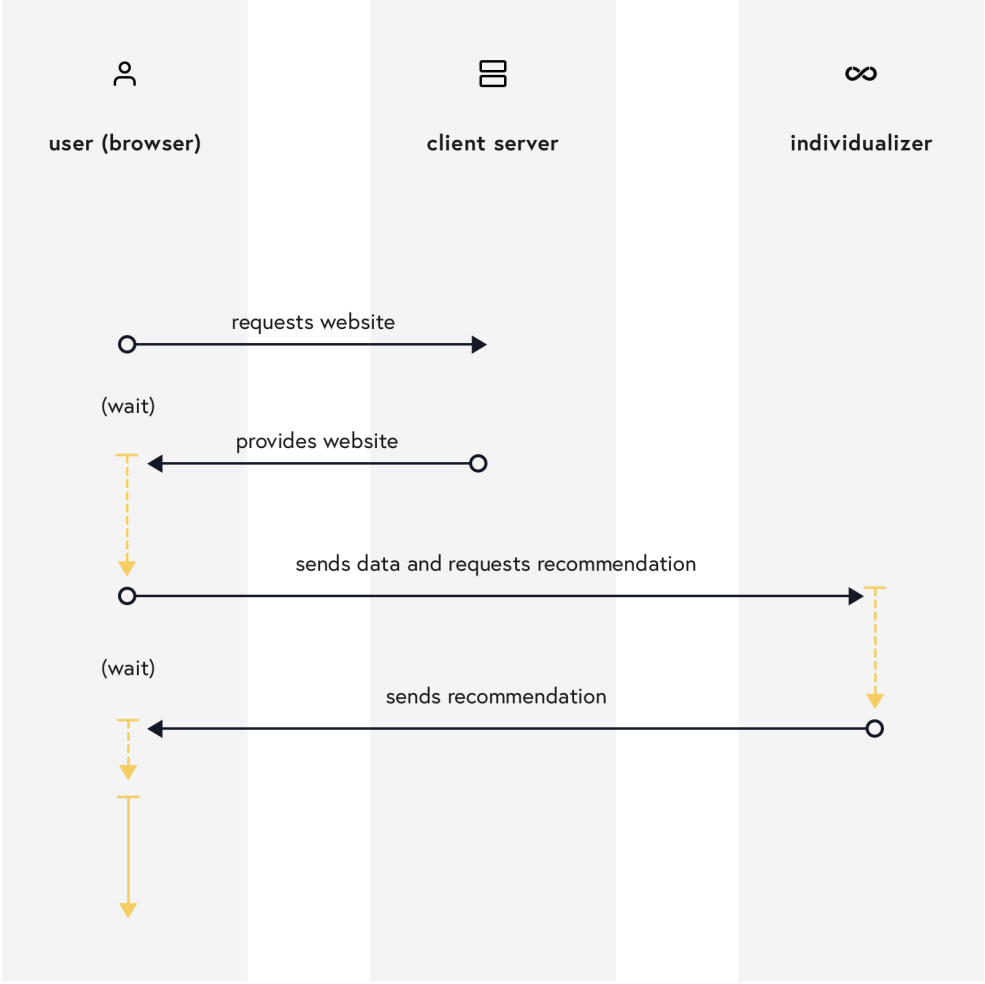

Figure 211: A high-level overview of how the personalization works

2.4.2 User side

The user requests the website by typing in the URL in their web browser and the client's server sends them the document as an answer. The first thing in the document will actually be a piece of javascript code which runs as soon as the DOM of the website is constructed. It hides the whole website to prevent the flash of unpersonalized content, sends the user data to the Individualizer API as a request and waits for a response containing the personalization rules. In case it does not receive the response quickly enough, it times out and shows the website with the last personalization rules it has received. If there are none, it just shows the non-personalized version of the site. After rendering the site and executing the personalization rules, it shows the website to the user, as demonstrated on figure 212.

2.4.2.1 User data

There are two categories of user data are going to be sent to and evaluated by the Individualizer. The first one is the information about the user such as location, local time, resolution, OS and many more, basically everything we can find out about the user. The second one is the user's activity, containing information about previous website visits, relevant ad campaigns clicks and the user's behavior on the personalized website.

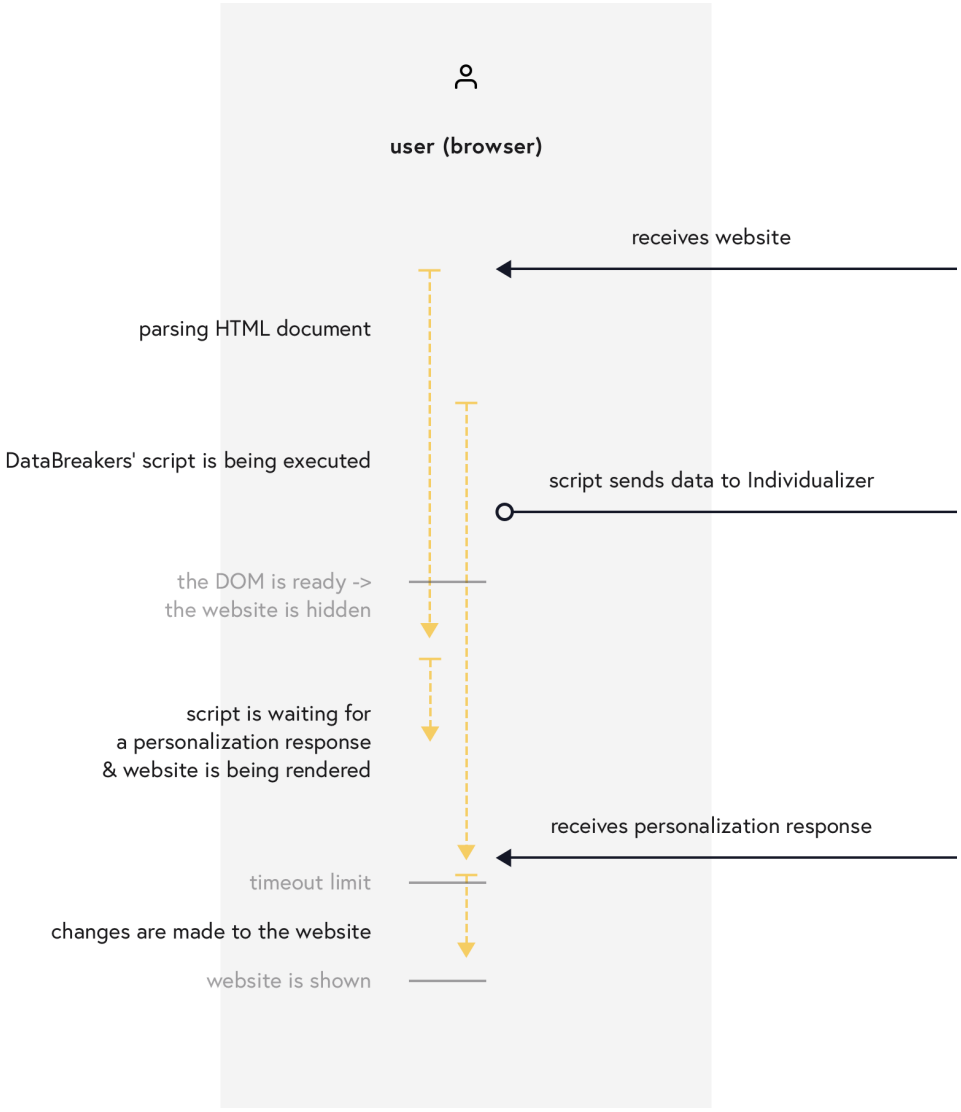

Figure 212: Detail of the user-side logic

2.4.3 Client server

We wanted to keep as much control as possible in our hands and came up with a solution perfectly enabling this. The script the customer includes on their site actually does only one thing: it downloads another script from the DataBreakers site. This way, we have absolute control over the script that gets executed, it can be changed anytime we need it to change and the customers will not be able to break it by making accidental changes to the code. In fact, DataBreakers are already using this solution for their information gathering script.

2.4.4 Individualizer

A lot of the personalization engine logic and architecture will be shared with to an already successful recommendation logic DataBreakers use for their Recommender. This side of the product is and will be actually overseen by Jan, who has created it. The back-end architecture is shown on figure 213.

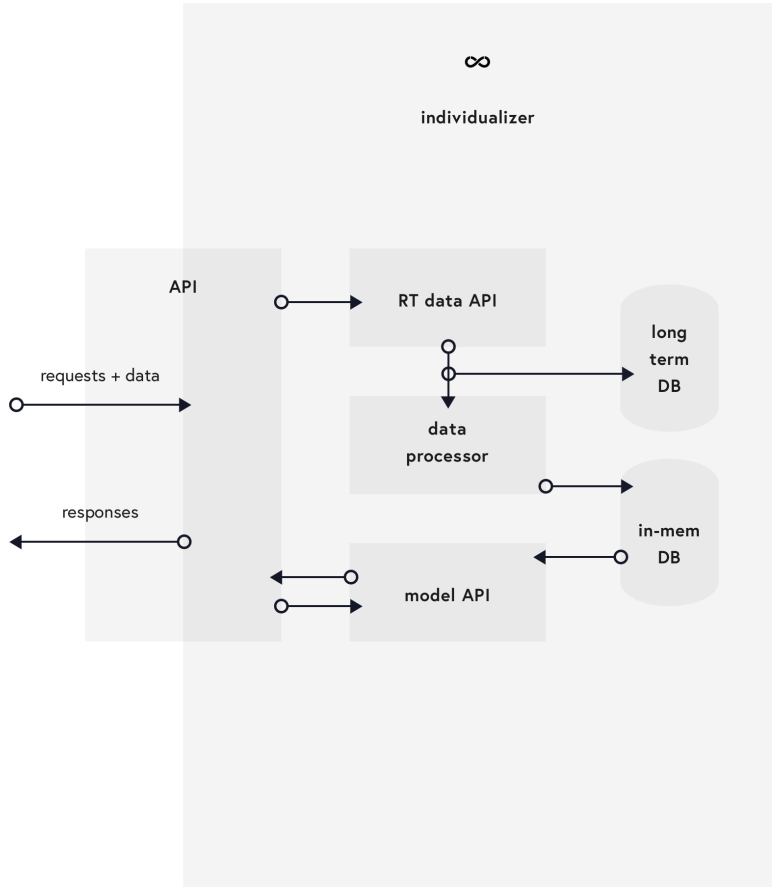

Figure 213: Detail of the DataBreakers-side architecture

2.5 Business model and monetization

Overall, DataBreakers are big on value-based pricing. This makes sense, because it is extremely easy to justify to the client. If a version of the e-commerce store with the product recommendation on makes the company 2 times as much money as the one without it, then the product creator definitely deserves to get a fraction of that extra money. Moreover, it also works the other way. In case the product is not performing as well, the clients are not paying as much for it.

However, pricing a website content personalization is not as easy. It will surely have impact, but it will not be as easy to track as finding out whether the customer bought something or not. It will influence the conversion rate most of the time, but not for every customer and not for every case of personalization. To properly understand the value of personalization, we will need to build an analytics tool that will be able to not only track the whole customer journey throughout different touchpoints, but we will also need to be able to measure the impact of each touchpoint on the decision to convert.

The first reference customer will get a pilot which will be precisely tailored to their needs in exchange for a fixed cost that should cover a major part of the costs to build it. For other customers, we will also go with a fixed price for a pilot, which should more than cover the resources spent on meeting the client, setting up the Individualizer to match their requirements and measuring the results. From then on, the clients will be charged periodically with the cost based on performance, pageviews and the estimated value of this solution for the client. As soon as we will be clearly able to measure how much actual extra money is brought to the customer by the Individualizer, we will derive its cost from that number.

2.6 Findings

2.6.1 Feedback

The feedback is a conclusion of the customer interviews performed during the qualitative prototype test.

2.6.1.1 Customer A

This customer responded positively to the idea of the product and agreed to do a pilot. Their interest indicates that this is an example of a good product-market fit, supporting the assumption that this product in its MVP stage will be interesting to medium- and large-sized companies.

They would like us to add a feature enabling connecting the personalization with the campaigns the user has reacted to and the ability to access the analytics anytime. This reaction moved those functionalities up on the priority

ladder and I will focus on testing their viability and rolling them out as soon as possible.

2.6.1.2 Customer B

Even though this customer has not provided any negative feedback, they were not particularly interested in becoming a reference customer and piloting the product. This hints at the possibility that this type of a customer would be fond of a solution that would allow them to set up the personalization themselves.

This also means that we should research the priorities of a customer of this type further and decide whether it is worth it to invest into providing these customers with what they really need at this moment.

2.6.1.3 DataBreakers

I asked Jan to give me feedback on the work done for DataBreakers for the duration of working on this thesis.

Approach to the Product Management was done very well in all aspects and Lea did outstanding job in all areas doing work as multiple roles. This is often needed in small company/startup setup and it is more demanding on the skill level of the Product Manager. Regarding the product itself, Lea defined focused MVP based on the testing landing page and meetings with real customers, performed technical feasibility study and mapped this new product to our existing product portfolio and technological stack. In the end we have everything ready to start building MVP - we have defined product, we know potential gains, risks and costs. Now we are going to validate our expectations in the next step of product development, which we will further continue with Lea in position of Product Manager.

2.6.2 Future

It seems that the MVP concept has been put together successfully, since both the potential customers and DataBreakers accepted it as direction to follow. The next steps are actually building and piloting the product for the first customer, which is, most likely, going to be the Customer A. Firstly, the business processes, which are handled by Nikol, need to be completed and the cooperation needs to be established. Then the developers led by Jan will implement the solution, which should take several weeks. A pilot version of the product will be deployed, measured and the product will be steered by its results.

After the pilot finally proves that the product is viable and is indeed doing what it is supposed to, the PM should be focused on taking the product from its MVP form to its full potential outlined by its product vision and strategy.

Conclusion

The goal of this thesis was to define the role of a product manager in a company and prove its importance. This was successfully done by taking up the role at the involved company, DataBreakers, and taking a product from an idea stage to a well-defined minimum viable product that is valuable to its potential customers.

In the first part, the theory of the role is explained. Much of the knowledge is drawn from Marty Cagan's book INSPIRED: How to create products customers love, as it is one of the must-reads on the subject. The conclusion is that a product manager is a person fully accountable for the product and the product team. Their primary responsibility is making sure that the products built are valuable to the customer and that the product team has adopted a missionary attitude towards what they are building. This is achieved by possessing deep knowledge of the market, customer, business and data, constantly improving the product or its features by prototyping and testing and by empowering their product team.

In the second part of the theory, the actual process of bringing a new product to the market is described. It is necessary to establish a product vision, which sets the product direction for several years ahead. The product strategy should be thought through as well, guiding the releases. The knowledge of the market, customer, business and data is required. This allows the rapid prototyping and testing to take place. The value testing should be done extensively and the feasibility and business compatibility should be tested as well. After settling on the right functionalities, the product can actually be defined and developed.

In the third part, the execution of the process is described. The product vision and strategy is set. The necessary knowledge is summarized, revealing interesting information such as that the website users actually respond well to personalization, or that the potential customers are very worried about the personalization solution affecting the performance of their website. Both the quantitative and qualitative tests of value show that customers are indeed

interested in this solution and are willing to pay for it. The feasibility test showed that the personalization solution adds only a negligible delay to loading the website. The business test showed that this product is worth investing into.

Lastly, customer feedback was gathered, pinpointing easier access to analytics and connecting the personalization with the campaigns the user has reacted to as possible improvements in the near future. We are currently working on a paid pilot for the Customer A.

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Appendix A

Acronyms

AI Artificial Intelligence

B2B Business to Business

B2C Business to Customer

DOM Document Object Model

GDPR General Data Protection Regulation

MVP Minimum Viable Product

P2P Peer-to-Peer

PM Product Manager

PPC Pay Per Click

URL Uniform Resource Locator

Appendix B

Contents of enclosed SD card

- `readme.txt` ..... the file with SD card contents description
- `src` ..... the directory of source codes
  - `thesis` ..... the directory of LaTeX source codes of the thesis
  - `mockup` ..... the directory of mockups used in 2.3.3
  - `lp-bap.sketch` ..... the Sketch source file with designs and diagrams
- `text` ..... the thesis text directory
  - `thesis.pdf` ..... the thesis text in PDF format
  - `thesis.ps` ..... the thesis text in PS format