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MASTER THESIS

# USING DATA TO IMPROVE FINANCIAL BEHAVIOR

## DESIGNING THE PERSONAL FINANCE PLATFORM

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# Foreword

Dear reader,

You are currently reading the result of the eleven months of research and design that concludes my Master Industrial Engineering and Management. During my masters I wanted to combine Finance and IT. Which is also the reason I accepted this graduation assignment. I wanted to use my practical knowledge and experience in IT to solve concrete financial problems. And I think I achieved that, not only in this graduation assignment, but also during the course of the entire master program.

First, I want to thank my supervisors at Topicus for their contribution and feedback. Without the sharp comments of Asjen, this thesis would be far less structured and he forced me to keep focused on the actual problem at hand. And Olaf contributed not only to the look and feel of the Personal Finance Platform, but also helped me create a design that focused on the user instead of the technique. I also want to thank my colleagues at Topicus who helped me brainstorm, design, verify, test and present in ways I have not done before.

Also, I would like to thank supervisors at the University, Reinoud and Abhishta. Reinoud helped me to raise this thesis to the academic level, and ensured that every statement, citation and reference was correct. And Abhishta's final suggestions helped to raise the discussion to a higher level and ensured that every subject was covered.

Finally, I want to thank my girlfriend Aniek who not only kept me motivated, and focused on the result, during the whole assignment. But also proofread every letter of this report multiple times. Without her, this report would have been very difficult to read and understand.

Hopefully you will enjoy the reading!

Mick van der Vegt  
Deventer, 19<sup>th</sup> of March 2019

# Executive summary

This graduation research project is performed in collaboration with Topicus and the University of Twente with the aim of designing a software product that activates and helps people to live a responsible financial life. This thesis describes the research and design of a software platform that will assist Dutch consumers in handling their finances in a responsible way. This Personal Finance Platform uses multiple data-sources (PSD2 and Ockto) to provide the user accurate insights in his financial situation.

We identified the main problem as a lack of awareness of the financial situation by the Dutch consumer. The consumer is currently exposed to large financial risks that he is often unprepared for, or even unaware of. There is a large amount of interest-only mortgage debt that is expected to remain after the mortgage ends. The Netherlands face an increasing number of self-employed workers, who are exposed to much higher risks than salaried employees. The number of debt assistance requests is rapidly increasing. These risks, combined with the fact that a lot of households experience difficulties getting by and saving enough, are concerning.

We also found numerous opportunities that the consumer could take advantage of. The current low interest rates create the possibility of refinancing debt with lower interest costs, and make (sustainable) investments yield much higher returns than the current saving returns. Additionally, applying for an unused but applicable tax benefit, or checking for double or missing insurances, could be very beneficial.

Our approach to solving the problem was by determining what financial responsible behavior is, and to find ways to increase financial responsibility. Financial responsible behavior is described as behaving in such a way that finances are kept in balance in both short and long term. The search into increasing financially responsible behavior yielded several ways to increase financial responsibility and discipline, such as nudging, financial education, setting SMART-goals and (financial) planning. We compared several existing software solutions that share the same goal. Finally, we used these results in the design of the Personal Finance Platform.

Through various brainstorm sessions, we created six concept solutions to solve the given problem. Together with Topicus we selected one concept that was further developed into the Personal Finance Platform. This platform provides a full overview of the financial situation of a consumer. The platform is able to achieve this by gathering and analyzing data from Ockto, PSD2 and user input. This provided overview is structured in six themes:

- Home and mortgage.
- Income and expenses.

- Tax benefits.
- Pension.
- Savings and capital.
- Loans and debt.

Under each theme, several checks calculate based on the provided data whether the user has a potential problem or an opportunity that has to be acted upon. The six themes combined provide an overall score of the financial situation.

To verify the demand for the Personal Finance Platform, we sent out a survey via a Facebook advertisement. The goal was to indicate which features were found interesting and useful, and which were not. The survey yielded 71 participants, and the analysis of the survey delivered various interesting results. Results that were not only useful for the development of the platform, but possibly also for other Topicus projects in the future. We found out that the interests of the prospective users are mainly in cutting fixed costs, future pensions, savings for unexpected expenses and unused tax benefits.

We used the results from the survey to create a Minimum Viable Product (MVP) prototype based on the designs of the Personal Finance Platform. This prototype was then used in a User eXperience (UX) test with five participants. The goal of this test was to determine the viability of the Personal Finance Platform as a product. During the test, several participants stated that they would use this solution in real-life, and all of the participants understood the information that the platform offers. However, we also received several suggestions for improvements, issues with the trust users have in the platform and privacy concerns related to the usage of personal data in the application. The main recommendation that followed from the UX-test is that this platform should be developed with a party or organization that is trusted by its potential users, such as a bank or government institution.

Finally, this report contains several conclusions and recommendations for Topicus and possible further research. If Topicus decides to develop the Personal Finance Platform further, we suggest several points that Topicus should look into (e.g. business case, launching partner or customer, further development) in order to make it a viable finished product. For science, we propose several interesting topics for further research.

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# Acronyms

**API** Application Programming Interface. 47, 48, 50, 53, 54, 56, 57, 59

**CBS** Central Bureau for Statistics. 13, 18, 23

**CSV** Comma Sperated Values. 38

**DNB** Dutch National Bank. 13, 18, 19, 21

**DSRM** Design Science Research Methodology. 12, 13, 62

**GDPR** General Data Protection Regulation. 75, 79

**MVP** Minimum Viable Product. 3, 66, 74

**Nibud** Dutch Institute for Budget Information. 7, 8, 13, 16, 18, 19, 22, 29, 37, 43, 47, 57, 59

**PSD2** Payment Service Directive 2. 2, 7, 36, 40, 42, 44, 47, 59, 68

**SaaS** Software as a Service. 7

**SMART** Specific, Measurable, Acceptable, Realistic and Timely. 33, 38

**UX** User eXperience. 3, 5, 14, 46, 66, 74, 77

**WOZ-value** Real estate tax value. 51

# Chapter 1

## Introduction

### 1.1 Project initiator

Topicus Finance B.V. is a financial software company located in Deventer. They are specialized in developing financial Software as a Service (SaaS) solutions for consumers, as well as back-end software for mortgages and banks. An example of one of their consumer products is *Monli*, a platform that helps people make a sound financial decisions in important moments in their life. The platform includes a checklist for buying a house, a tool for mortgage calculations and game that teaches children to save and spend their money wisely. Topicus is an IT-company with impact, their mission is to develop products that have an impact on society.

### 1.2 Problem introduction

The Dutch Institute for Budget Information (Nibud) states that only 32% of the Dutch households save a fixed amount of money each month ([Nibud, 2018c](#)). Considering the current saving climate, with low interest rates ([Spaarrente.nl, 2018](#)), this is understandable. But from a broader perspective, it can be beneficial to start thinking about financial plans now instead of later. Not only could it be sensible to lower the exposure to unwanted risks and save resources for the future, but also increase the impact achieved with the available financial resources. For example investing in sustainable house improvements such as solar panels.

Financial products are often conceived as complex, moreover there are a lot of different products and options. Therefore, financial planning can be perceived as a difficult task to start with. Some financial institutions offer small applications (e.g. Straks Heb Je Het Nodig) to activate consumers to think about their financial future ([Rabobank, 2018b](#)). There is still a lot of room for improvement, as most tools are currently just a questionnaire to steer you towards a simple capital goal instead of an intelligent personalized finance plan.

Through new data sources from both the government and financial institutions, more and more data are becoming available for innovative companies to access and create new products. Using the new Payment Service Directive 2 (PSD2) standard ([Nederlandse Vereniging van Banken, 2018](#)) private companies obtain the ability to access financial records from their clients. This information coupled with other (possibly) available data sources such as income tax records and pension information, provides the possibility of creating a tool that helps



people with their personal finances and activates them to work towards a better financial future.

## 1.3 Core problem

The core problem is that *(some) people are unaware of their financial situation and neglect structured planning to improve it*. The goal of this project is to find a smart way to let people responsibly handle their personal finances. We want to activate them to start planning their financial future. And make them improve not only their financial situation, but also increase the impact that they have with their money on themselves and others. We want to find a way to decrease the risks that people are exposed to, caused by the lack of financial planning and structure in their lives. The preferred solution (for Topicus) is a form of application, website or tool.

### 1.3.1 Problem cause

According to the Nibud, 2,5 million Dutch households lack financial resources and as a result experience unwanted financial risks (Nibud, 2017). Nibud states that just telling people to start saving is not enough to activate them, because almost everybody understands that saving money is necessary. Furthermore, a part of the households, especially those with low incomes, just do not have sufficient financial means to save enough. Another reason for neglecting to save is psychological (Nibud, 2017). The saving interest is close to zero and because of that the incentive for people to save is lower as they feel it is without results.

Another cause that Nibud identifies is the current Dutch tax system. Dutch citizens gain certain tax advantages when their savings are below a threshold of 1500 to 2000 euros (depending on the municipality). If their capital exceeds that threshold, a lot of tax benefits are lost. As a result the incentive is to stay below that threshold and spend instead of save money. Nibud advises to have at least 3500 euros of money saved, which is far above the remission limit. So in the current system, these tax advantages give the wrong incentives those households.

Nibud also advises that the government and businesses to aid the consumer in saving their money. Their suggestion is to make the customer automatically save beforehand. This can be done with the purchase of a car, by automatically setting money aside to cover repairs in the future. Or by including an amount for house maintenance in the monthly mortgage payments.

## 1.4 Research objective

The goal is to create a software product that activates and helps people to live a responsible financial life. This product should help people with organizing or structuring their finances, and also motivate them along the way. It should give them perspective on, or at least awareness of, their financial situation both now and in the future.

Also the impact, both social and ecological, that people can make with their financial resources should be factored in. This is something that is very important to Topicus, as they

strive to not only to be profitable, but also make a positive impact on society. For example, money on your savings-account has low risk and sounds very responsible, but gains little benefits in both interest and impact. Lending out micro-loans to people in developing countries, crowd-funding a local business, or investing in solar panels has more risks, but can be very rewarding in terms of interest and make a positive impact on society. This positive side to acquiring personal capital can contribute to peoples happiness and engage them more with their financial life.

## 1.5 Target group

Everyone should be living their financial life in a responsible way, but this project targets *consumers that are currently not interested in, or activated to improve their financial situation*. These people have little (or no) interest in financial products and their own financial situation. That does not necessarily mean that they are in trouble or that they have large amounts of debt, but that they can gain from being more aware of their situation.

In fact people could have a very healthy checkbook and spend significantly less than their income, but can still gain from that awareness. Having money, but not using it, is also something that can be improved. The impact that can be made by investing could make people enjoy their capital more, and give them the opportunity to contribute to something that they feel is important.

As we want to develop either a website or a mobile app, people who have no affinity with computers and smart phones are out of scope for this project. People have to be responsible for their own finances, so children and people that outsource their personal finances are not the target either. Finally, after some preliminary research we concluded that extreme problematic cases, such as persons in debt restructuring, are also out of the scope. This is because we find it extremely unlikely that we can develop a solution that does a better job than the professional care that those people are currently receiving. But this solution can potentially help prevent those extreme problematic cases by activating people to mitigate their financial risks and pay off their debts.

## 1.6 Research questions

This section states the research questions that are answered during this project. In this research two types of research questions shall be answered, knowledge questions (KQ) and design problems (DP) ([Wieringa, 2014](#)). The first three questions are answered using literature and statistical analysis of research data. The design problems are solved using design science. Finally, in the last question the requirements found in the literature are verified. Figure 1.1 shows a graphical representation of this approach.

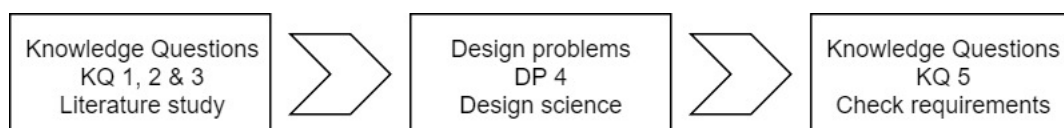


Figure 1.1: High-level research methodology.

### **KQ-1: How do consumers currently handle their personal finances?**

To really understand the problem, we need to know how people are currently planning their personal finances. Which products they use and whether they do so with a preset plan or just make their choices without longterm planning. Furthermore, it is relevant to know the current trends in the consumer finance market.

- How aware are consumers of their current financial situation?
- Which personal financial products are used in the Dutch consumer finance market?
- Which trends and issues can be identified in consumer finance?
- Which risks and problems are consumers exposed to and what causes them?

### **KQ-2: How should consumers responsibly handle their personal finances?**

In order to move people in the right direction with their financial situation, we have to know the best way to do that. Understanding what consumers want and need to do is critical in helping them accomplish this. An overview of the used financial products would give a better understanding of the current consumer financial market. Finally, the effects of those products and planning decisions need to be known.

- How should consumers mitigate the risks and problems they are exposed to?
- What are possible products for personal finance management?
- What is the effect of financial products on consumers' financial situations?

### **KQ-3: How can we help and activate consumers to responsibly handle their personal finances?**

This question is already partly answered in the 'Problem Cause' section. In order to help consumers in planning their financial situation, we first need to understand the reasons why they currently neglect that. Eventually we will look for ways to change their behavior.

- What are reasons for consumers to neglect their financial situations?
- How can we activate consumers to change their unwanted or irresponsible behaviors?
- How can we activate consumers to work on their financial situations?

### **DP-4: How can we design a solution which activates consumers to responsibly handle their personal finances?**

The core of this research comes down to activating consumers to change their behavior and to make them more proactive in their financial situation.

**KQ-5: What effect does the proposed solution have on the way consumers handle their personal finances?**

Finally we have to measure the effect of our solution on the way consumers plan their personal finances.

- Will consumers use this solution?
- Does the usage of this solution affect their financial situation?

# Chapter 2

## Methodology

### 2.1 Plan of approach

The approach of this project is divided into multiple steps, the sections below describe each step. To structure the plan of approach of this project, I will follow the Design Science Research Methodology (DSRM) (Peffers et al., 2007). This allows me to structure the design of the product, and give this research a methodological framework to work by.

#### Design Science Research Methodology (DSRM)

This methodology has originally been developed to provide a methodological structure for research in the field of Design Science on Information systems. This is defined as: *Design science ... creates and evaluates IT artifacts intended to solve identified organizational problems* (Hevner et al., 2004, p. 77). However, in this case the methodology will be applied to non-organizational problems. The process is divided into six steps for designing a solution for an IT-problem. See Figure 2.1 for an overview of the Design Science Research Methodology (DSRM) process.

1. Problem identification and motivation.
2. Objective of the solution.
3. Design and development of the solution.
4. Demonstration.
5. Evaluation.
6. Communication.

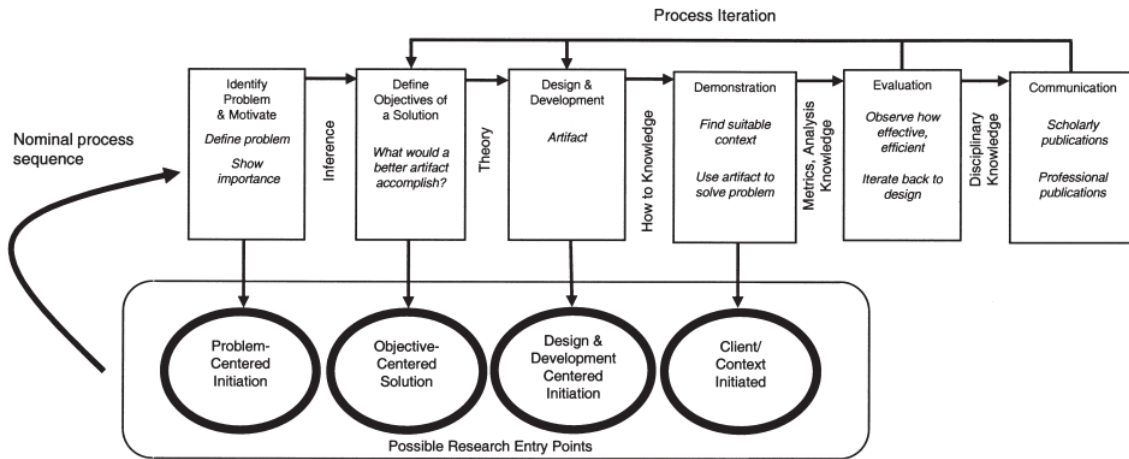


Figure 2.1: Overview of the DSRM Process Model (Peffer et al., 2007).

## Step 1: Problem identification and motivation

In order to find out how the consumer currently plans his financial future, an overview of the products currently used is needed. Furthermore, information on when and why a consumer currently starts planning their finances is required. Do age, gender or education influence the way a consumer plans (or does not plan) their finances? A set of personas (fictional persons that are representations of the target group) are created, in order to have a detailed view on the target group. Finally, the effects of financial planning and saving need to be investigated. This will be done with literature research and using statistics from Nibud, Dutch National Bank (DNB) and Central Bureau for Statistics (CBS). In this step KQ-1 and KQ-2 will be answered. This step is discussed in Chapter 3.

## Step 2: Defining objectives

To activate consumers, we create a list of initial goals and objectives for a solution that helps and stimulates consumers to improve on their financial situation. In this step objectives for the developed product are defined. In order to do that KQ-3 will be answered. Furthermore, some investigation into already developed solutions will give us an idea of what works and what does not work when activating consumers. After some initial research into comparable products I found several initiatives that already operate on solving this problem. This step is discussed in Chapter 4.

## Step 3: Design and development

This step in the DSRM process is modified slightly for this project. During the multiple iterations of the process the focus shifts from developing an idea, to developing a way to retrieve the data and finally to the product design. This step is therefore broken up into four parts.

### Step 3a: Idea development

In this step a clear plan for activating, motivating and informing the user is developed. This may be achieved by creating better insight and reachable goals, but could also use

gamification or a structured saving app (such as the Rabobank App Peaks ([Peaks, 2018](#))). Several ideas will be investigated and multiple alternatives will be presented. Using a scoring approach, each alternative will be scored and finally the best solution will be selected. In this phase DP-4 will be answered. This step is discussed in [Chapter 5](#)

### **Step 3b: User eXperience (UX) design**

After the initial idea has been developed, the way consumers will use the product is designed. UX-design focuses on the way users interact with the solution. What information is shown, and how it can effectively be used to inform and activate the user without causing unnecessary frustrations and distractions. Example screens-shots are designed that show vital design elements, and display how the user is activated. This step is discussed in [Chapter 6](#).

### **Step 3c: Data retrieval**

In order to create the prototype, (financial and personal) data are required. In this phase we investigate which data are accessible and how they can be accessed. We already did some preliminary research on financial transaction data, and found some promising information on ways to retrieve reliable data for the users. This step is discussed in [Chapter 6](#).

### **Step 3d: Product design**

After developing an initial idea and developing an understanding of the retrieval of the data, the full product can be designed. The goal is to design both a technical specification and an interface for the final product. The design should be detailed enough for a development team of Topicus to be able to create the first version of the product. This step is discussed in [Chapter 6](#).

### **Step 3e: Prototype development**

In this step a working prototype of the product will be developed. The goal is to obtain a proof-of-concept of the initial idea behind the design and show viability of the product. The main features should be working and a demonstration for users and other stakeholders can be performed. This prototype is also used for testing in the next steps. This step is discussed in [Chapter 7](#).

### **Step 4: Demonstration**

In this step we will test the prototype on various test subjects. The goal is to measure whether we achieved the objectives that we set out in Step 2. We will use a survey to measure the demand from users for various features. With the data obtained from the survey we will create a prototype. And that prototype will be used for UX-tests. This step is discussed in [Chapter 7](#).

### **Step 5: Evaluation**

In this step we will evaluate the test results from Step 4. In this step we will answer KQ-5. This step is discussed in [Chapter 7](#).

## **Step 6: Communication**

The results of this research will be the designed product, the answers to the research questions and a set of recommendations for Topicus. The answers, conclusions and recommendations will be communicated through this report, and can be found in Chapter [8](#) and [10](#).



# Chapter 3

## Problem identification and motivation

This chapter provides an overview of how Dutch consumers currently handle their finances. It explains which products they use and which major problems exist in the current consumer financial landscape. The goal of this chapter is to summarize the main issues for Dutch consumers and to provide an insight in what causes those issues.

### 3.1 Overview of financial products

Several groups of financial products are used by the Dutch consumer. We looked into the most commonly used products and trends. An overview of the common financial product is provided by Nibud ([AFM, 2018](#)):

- Insurance.  
There are many types and categories of insurances. The most common insurances are mentioned below.
  - Life insurance.
  - Car insurance.
  - Damage and house insurance.
  - Health insurance.
  - Travel insurance.
- Loans.  
There are several ways a consumer can borrow money, ranging from mortgages to private loans. The most common reason to borrow is to buy a house, car or mobile phone. But there are also short-term loans such as revolving credits or credit cards.
- Savings and payment accounts:
- Mortgage.  
Mortgage is special type of loan as it includes a claim on the underlying asset that can be activated when the borrower can not for full his obligations. This makes the investment less risky for the financier, which lowers the interest rates. Consumers often use mortgages to finance their house. Mortgages come in different forms, we will discuss the most common below.

- Annuity mortgage.  
The client pays a fixed amount, built up in two parts: the interest and the repayment. As the mortgage is paid off, the interest decreases and the repayment increases thereby changing the distribution of the mortgage payment.
- Linear mortgage.  
The client pays fixed repayment each month. The interest payment gets lower every month.
- Interest-only mortgage.  
The client only pays interest and never pays back its debt during the mortgage period. At the end the full debt is paid or a new mortgage is taken out. This type used to be very common, as it maximizes tax deduction of the mortgage, but due to new legislation this type is less popular.
- Saving mortgage.  
A type of interest-only mortgage. But in addition the client saves monthly into a locked savings account. These savings are used to pay off the debt in full at the end of the mortgage.
- Investment mortgage.  
A type of interest-only mortgage. But in addition the client monthly deposits money that is invested on behalf of the client. The invested amount, with returns, should be enough to pay off the mortgage in full.

Accounts for consumers to store money on the bank. Most accounts are directly accessible, but some products offer ways to deposit money for a fixed period against higher interest rates.

- Pensions.

In the Netherlands every working individual receives a state pension (called AOW). Next to that there are several options to build up an additional pension. The most common type is the pension fund in which the employer and employee deposit monthly. But there are several ways to build up your individual pension. Banks and financial institutions provide pension products, but also investments such as houses could help build up a pension.

- Investments.

There are various forms of investing. The most common are discussed below.

- Crypto-currencies.  
Crypto-currencies are a new type of investment. These so called crypto's are distributed in a blockchain network that keeps track of currency transactions. The value of these products is highly volatile with fluctuations of more than 100% within a day, so investment is very risky.
- Stocks and bonds.  
Investing directly in either ownership or debt of corporations (or governments).
- Investment funds.  
Investment funds invest on behalf of the participants. Investment funds diversify their investments, which should reduce the risk of the investor.
- Structured products.  
Several types of structured products exists, such as futures, options and trackers.

These products are more complex than the products discussed above and often consist derivatives of products mentioned above.

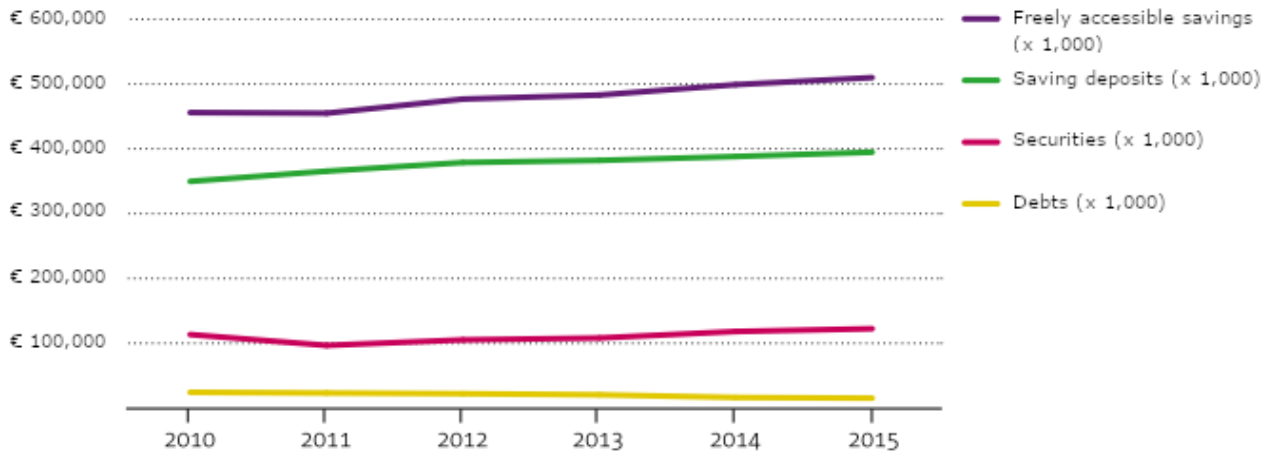


Figure 3.1: Savings and debts in Dutch households (Wijzer in Geldzaken, 2016).

A report from Wijzer in Geldzaken (2016) shows statistical data on the Dutch consumer financial market. The report bundles data from the DNB, Nibud and CBS to create an overview of the consumer financial products as well as trends and sentiments on the consumer market. Figure 3.1 shows the distribution of savings and debts in the Dutch households. The largest parts of consumer assets is in savings and deposits.

## 3.2 Current state of consumers' financial situation

Though the Dutch consumer has a significant amount of savings and deposits, 45% of the Dutch consumers have difficulties getting by each month (van der Schors et al., 2015). The following specific groups experience the most difficulties:

- People with low income.
- Low and middle educated.
- People on state benefits.
- People with rental houses.
- 45 to 64 year olds.
- Singles (with or without children).
- People with debts or who experienced negative financial events.

Figure 3.2 shows that 32% of the people save automatically and only 25% of the households set up a budget. Also, roughly 72% know how much they have left after paying their monthly bills. van der Schors et al. (2015) concludes that people who make a yearly budget also keep track of their expenses and financial administration on a regular basis. They also found

that not making a budget does not mean that people do not have insight in their financial situation. However, Nibud could not find a link between *making a budget* and *getting by*.

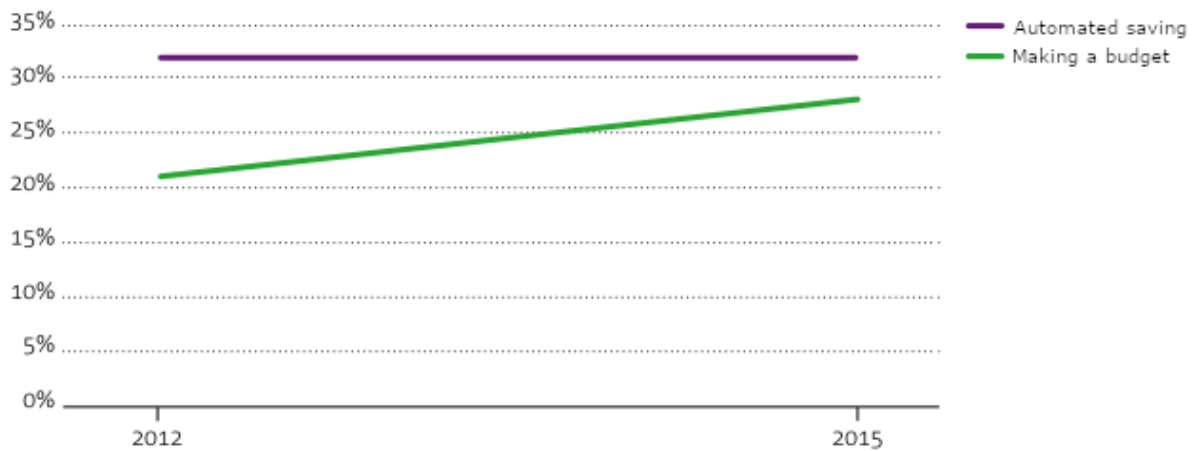


Figure 3.2: Automatic savings and budgets for Dutch households (Wijzer in Geldzaken, 2016).

Another important indicator according to Nibud, is whether consumers know in which months they have more expenses. Of the group of consumers that have trouble getting by, 66% does not know in which months their expenses are highest. Also that group often has regrets after buying something. After the purchase, the same group indicates that they often have bought something that they could not afford.

### 3.2.1 Financial Literacy

Tomášková et al. (2011) defines financial literacy as *a set of knowledge and skills necessary for people to financially secure themselves and to behave actively in the market of financial products and services*. Key elements of being financially literate include understanding financial products and markets, economic principles, and understanding how to use financial products. Financial literacy is identified as a key indicator of retirement planning. And people who are lower financial literate are less likely to trade, invest and re-balance portfolio's (Gerrans et al., 2018). Financial literacy has shown to be a good indicator on intentions of saving or planning of retirements (Gerrans & Clark, 2013). Financial education has shown to have positive effect on long term behavior, but little to no effect on short-term financial behavior such as paying credit-card bills on time or making monthly mortgage payments (Wagner & Walstad, 2015). Shen et al. (2016) has shown that people with higher financial literacy are less likely to experience financial disputes, and when they experience a dispute, are more likely to handle the problem. Investors with low levels of financial literacy are less likely to consult advisors (Calcagno & Monticone, 2015). Other evidence states that financial literacy and household wealth have a significant positive correlation (Shen et al., 2016).

Alessie et al. (2011) tested subjects on three basic principles in financial literacy (compound interest, inflation and risk diversification). Their result has shown that only 44.8% of Dutch respondents could answer these basic questions on financial literacy correctly. A study by Rooij et al. (2011) and DNB also found that there was a strong link between financial knowledge and retirement planning. People with more financial knowledge were more likely to

plan for retirement. So being financial literate is a good indicator of making responsible financial decisions and being able to handle yourselves in the financial market.

### 3.2.2 Pensions

The Dutch pension system is built up in three pillars ([Vereniging van Bedrijfspensioenfondsen & Stichting van Ondernemingspensioenfondsen, 2009](#)).

1. The state pension (AOW).

The state pension is the base income for retirees. The amount one receives is linked to the minimum salary in the Netherlands. Couples each receive 50% of the minimum salary and singles receive 70%. In 2007, 2,7 million people received a state pension, the total amount was 25,5 billion euros.

2. The collective company pension.

The collective pension is built up by most people who work in salaried employment. These pensions are organized by pension funds and insurance companies. The payout is determined by the pension premium that is paid by employee and employer, and the return on the collectively invested pension funds.

3. Individual pension products.

There are several ways to build extra pension. Savings, investment in a house or investing in stock market and funds are an option ([PensioenPower, 2007](#)). Another possibility is private pension products of banks and insurance companies such as life annuities and blocked bank savings account which have various tax benefits that regular equity investments do not have.

These three pillars combined determine the amount someone receives after retirement. Currently, there are various social developments in the Dutch pension systems, which requires attention from the Dutch consumer ([van der Schors & Warnaar, 2015](#)). These developments include:

- Increasing number of self-employed workers.
- Less government involvement.
- People change jobs more often.
- Changing pension system.

This causes the pensions to be more complex and the consumer to be more and more self-reliant for their own financial future. Unfortunately, not all consumers live up to this new responsibility. Only 40% of the consumers between 25 and 65 know whether their income will be enough to cover their expenses after retirement ([van der Schors & Warnaar, 2015](#)). This unpreparedness, coupled with the interest-only mortgages discussed in Section 3.2.3, can result in financial problems after retirement (such as forced house sale). A study done by Rabobank concludes that, even with partly repaid houses taken into account, 31% of the salaried workers and 43% of the self-employed do not have enough pension (where enough pension is defined as 70% of the current working income) ([Treur, 2018](#)). The same study also states that currently 52% of the retirees still have a mortgage on their houses, compared to only 40% in 2006.

### 3.2.3 Interest-only mortgages

The largest part of the Dutch mortgages, more than 50% (Knopers, 2018), are interest-only. This means that, during the course of the mortgage, there is no built-in repayment in the monthly premium. So the full amount of the loan has to be paid at the end of the mortgage (Rabobank, 2018). It is possible to make intermediate repayments, but this is often limited to 10 or 20% of the outstanding mortgage per year (Vereniging Eigen Huis, 2018a). The benefit of an interest-only mortgage is the fact that the Dutch tax system allows you to deduct the interest costs of your taxable income (Belastingdienst, 2018). This can effectively reduce the net interest costs by up to 51%<sup>1</sup>. The lack of repayment in an interest-only mortgage causes the deductibility to be maximal during the course of the mortgage.

Since 2001 the maximum time period for tax deduction on mortgage interest is 30 years. This means that after the 30 years, the interest costs can no longer be deducted from the taxable income. Consequently, the net interest costs will then double (van de Laak, 2017). This, combined with the fact that people often experience an income drop after retirement, causes problems. People have the risk of not getting a new mortgage, remaining debt (see Figure 3.3) and possibly having to move out of the house to pay off that debt.

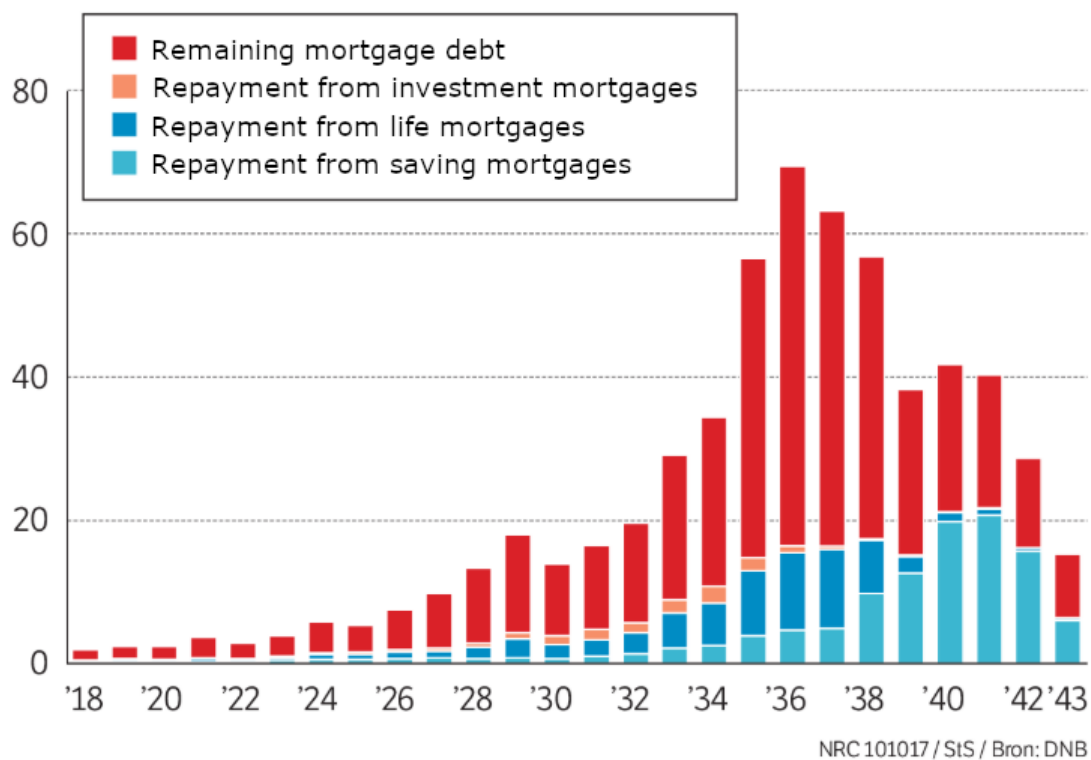


Figure 3.3: Remaining debts on interest-only mortgages (Beunderman, 2017) in billion euro's over the years 2018 to 2043. Edited for translation.

The awareness of consumers on the mortgage tax deduction legislation's is low. A survey among 4,000 seniors concluded that 40% of the elderly with an interest-only mortgage have no plan to pay off the remaining debt (EenVandaag, 2018). The DNB states that 200,000 Dutch households with interest-only mortgages might experience financial trouble because of

<sup>1</sup><https://www.nibud.nl/consumenten/inkomstenbelasting/>

that. Especially the period from 2035 to 2038 will see many ending interest-only mortgages. This can result in house sales, which can also have an effect future house prices as the amount of available houses increases.

### 3.2.4 Debts

Debt is an increasing problem in the Netherlands. The total number of people that request debt assistance is increasing every year (Madern, 2014) (see Figure 3.4), with an average debt of 37,700 euros in 2013. One in every five households has risky debts (Divosa, 2017). One of the causes of the increase in debts of the past years, is the fact that the crisis caused a drop in house prices. Some mortgages are higher than the current value of the house, and there has been a 23% increase in mortgage arrears in 2014.

Another cause for the increasing debt is the new health-care insurance system. With the obligatory deductible excess (the part of the health-care costs the insuree has to pay for himself) in the health-care insurance, the amount of problematic debt in the health insurance is increased to 1 billion euros. Nibud identifies a lack of financial skills and wrong choices (such as high loans) as one of the main causes of financial trouble and debts. But also the Dutch Tax Authority is a common creditor for people with problematic debt (Moerman & Oberzaucher, 2014).

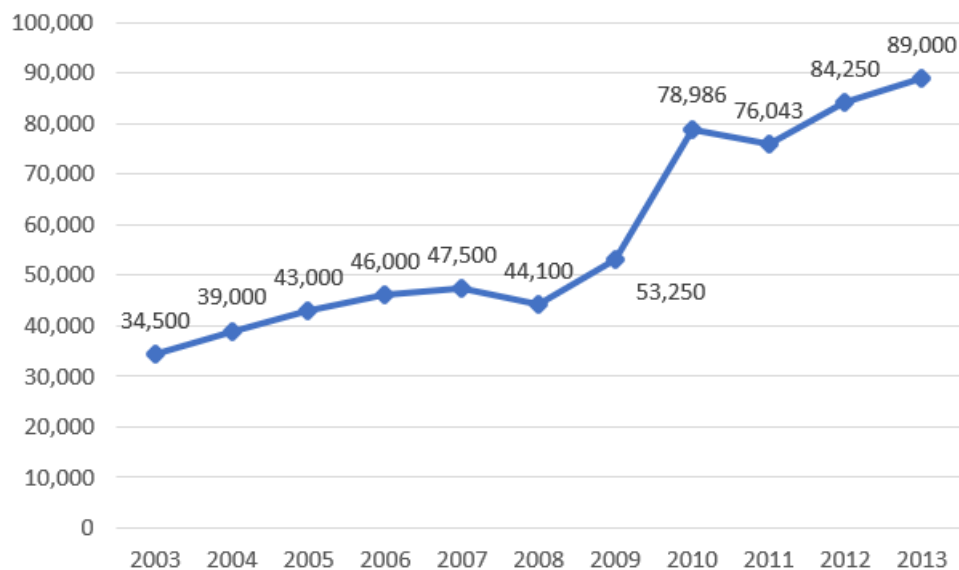


Figure 3.4: The number of debt assistance requests in the Netherlands (Madern, 2014).

Dutch municipalities are responsible for debt prevention and control in their municipalities (Rijksoverheid, 2018). They have several ways to help people with problematic debts. A possibility is to mediate between creditor and debtor, or advise and manage a (forced) personal budget. Several legal tools can provide mediation with creditors. A possibility is a forced 6 month *breathing break*, during which the creditors can not make any claims on outstanding debts. This gives the debtor time to get their affairs in order. Another approach is to let a judge decide on how the debt is going to be resolved.

The current cabinet is planning to decrease the number of households with problematic-

debts by providing better help and advice. The cabinet is consulting with municipalities to discuss the new problematic-debt approach. They want to focus on preventing fines, and excesses in debt collection.

### 3.2.5 Self-employed

The number of self-employed workers in the Netherlands is increasing. Currently about 12% of all the working people are self-employed ([Pelgrim, 2018](#)) and this percentage keeps on rising. For about 900,000 people, their self-employed business is their main source of income ([Centraal Bureau voor de Statistiek, 2018](#)). This shows an enormous increase compared to 330,000 in 1996 ([Pelgrim, 2018](#)).

There are several causes for this increase. Self-employed workers are cheaper to hire than salaried employees because of tax regulations. The cost of a self-employed worker, given the same income, is about half of the cost of an employee with an employment contract. Additionally they are easier to fire than salaried employees. Because of this, there is a strong benefit for the employer to contract self-employed workers instead of employing them.

For the self-employed workers there are also a lot of benefits. The most important one is the fact that they do not have a boss to listen to. They can set their own working hours and feel free and flexible ([Pelgrim, 2018](#)). Almost 81% of the self-employed are happy with their jobs, compared to 78% of the salaried employees. Most of them started in salaried employment and later started their own business.

But there are several disadvantages to self-employment. The most important one is the insecurity of income. Close to 12% of the self-employed live below the poverty line, compared to just 3% of the salaried workers. Also a lot of self-employed workers are not really self-employed, but just have different (cheaper) labor contracts than salaried workers. Close to 15% of the self-employed match the characteristics of fake self-employed. Meaning that they have the same work relation as salaried workers, but do not have a normal employment contract (e.g. parcel delivery drivers). The CBS concluded that only 1 in 5 self-employed, started their own business voluntary ([RTL Nieuws, 2017](#)). Most people are self-employed out of necessity ([RTL Z, 2016](#)).

Self-employed lack some benefits that salaried workers receive. They have to take care of their own retirement plan ([Kamer van Koophandel, 2018](#)). But, as stated earlier, 43% of the self-employed do not have sufficient pension arrangements. Also, self-employed lack the job security that an employment contract provides.

### 3.2.6 Financial risks for consumers

The absence of sufficient financial resources can bring a lot of risks to a consumer. When an unexpected expense needs to be covered and the available money at hand is insufficient, people often resort to a loan to solve the issue. [Nibud \(2016\)](#) advises consumers to save 10% of their monthly net income for unexpected expenses such as replacing inventory (computers, car, dishwasher, and fridge), cover unexpected bills (health insurance), and car and house maintenance. For a single person on state benefits without a car this means having at least 3300 euros of savings at hand.



Losing income is also a risk that has to be taken into account. According to a recent study ([van der Schors & Warnaar, 2015](#)), only 40% has knowledge of their financial situation after they lose their ability to work. 56% of the subjects replied that they know that they can pay the bills if their partner dies. Only 45% of the subjects sees the covering of the risks of unemployment, incapacity for work and the death of a partner, as an important financial goal. So there is a lot of unawareness regarding the risk of losing income. In a study by [Nibud, CentiQ and Wijzer in Geldzaken \(2010\)](#) 50% of the respondents stated that they experienced an income drop of more than 500 euros after losing their job. Almost 70% of the unemployed have trouble getting by, 50% of them have less than 1000 euros of savings, 30% experience financial troubles, and another 20% have a large risk of getting into financial troubles.

For consumers with a mortgage, the current interest rates also present a risk. At this moment the interest is very low. When, in the near future, interest rates start increasing, this can result in a high risk of payment issues with mortgage loans ([Financieel Recht Advocaten, 2016](#)).

### 3.2.7 Opportunities for consumers

After we have discussed the problems and risks consumers have, we can also find a lot of possible untapped opportunities that consumers can gain from. This section discusses some of those opportunities and gives an indication of the impact of these opportunities.

#### Sustainable investments

A trend in the past years has been investing in sustainable upgrades for houses. The recent Dutch energy agreement aims to disconnect 2 million houses from the natural gas network in the Netherlands by 2030 ([van Gerven, 2019](#)), which requires investments by home owners. There are large costs involved with sustainability improvements, but those investments also have significant returns. For example solar panels can have a return of about 6% on their investment ([Milieu Centraal, 2018](#)). Compared to the current saving interest of maximal 0.35% this presents an enormous opportunity. The costs of these panels keep decreasing, so it might even be a better investment opportunity in the future. ([van Gerven, 2019](#)) shows several options for sustainable house improvements such as heat pumps, wall and floor isolation and efficient radiators. Several tax discounts and subsidies might apply on these investments. When home improvement is not an option there are several sustainable investment funds that ensure the money is invested in a responsible way ([Portaal Duurzaam Financieel, 2019](#)).

For individuals with a surplus in savings, this might be a solid opportunity with more returns than the savings account. Since the surplus savings are not immediately needed as buffer to cover unexpected expenses, taking a bit more risk by investing could be something to consider. In this way investments not only have a monetary benefit, but also result in an environmental benefit.

#### Lowering mortgage interests

Due to lower interest rates, refinancing the old mortgage can result in lower monthly interest payments ([Vereniging Eigen Huis, 2018b](#)). Depending on the period that the current interest rate is fixed, several costs and charges might apply. A sensible use for the resources freed up

by the lower monthly costs, could be to make (larger) pay-off payments to lower the mortgage debt. This further decreases the monthly costs over time and lowers impact of the possible risks such as losing income.

### **Tax benefits**

The Dutch tax system is very complex. There are several tax advantages for different income scales. Rent, childcare and health-care tax benefits can result in a benefit of up to 350 euros per month ([NU.nl, 2014](#)). Also there are several municipal tax benefits and discounts ([RADAR, 2018](#)). Some of these benefits are connected to the income tax, others have to be applied for by the consumer himself. A lot of benefits can be gained by applying for these benefits timely.

But these (often monthly paid) benefits also result in a source of risk for consumers. [Moerman and Oberzaucher \(2014\)](#) describes how the dutch tax benefits system can cause problematic debt. The system works with a monthly tax advance, that is finalized when the yearly income tax is calculated. The tax system uses an estimate, often made by the beneficiary himself, of the yearly income to calculate the monthly tax benefit. If the estimate turns out to be incorrect, the yearly income tax is used to correct that. In 2011, more than 1.67 billion euro's of tax benefits had to be recovered by the Dutch Tax Authority ([Moerman & Oberzaucher, 2014](#)). When the tax payer does not have enough reserves to immediately pay back the incorrectly received benefits, this turns into a debt.

### **Insurances**

Only 36% of the Dutch consumers checks regularly for double or under insurance ([van der Schors et al., 2015](#)). Being under or double insured can present both a threat as an opportunity. It can expose the consumer to unwanted (and unexpected) risks, but may also lead to structurally overpaying for insurance. Another aspect is the degree of insurance. Both the maximum of payout and the amount of compulsory excesses (e.g. in health insurance) can be often optimized to reduce fixed costs. [SNS Bank \(2018\)](#) provides an overview of which insurances have to be checked when moving in, to prevent double or under insurance.

## **3.3 Personas**

We created five personas to get a better understanding of the users experiencing the problems. A persona is *a description of a specific person who is a target user of a system being designed, providing demographic information, needs, preferences, biographical information and a photo or illustration* ([Dong, Kelkar & Braun, 2007](#)). Each have their own challenges, problems and opportunities. Later these personas can be used to display the benefit of the solution. See Appendix [A](#) for the personas.

## **3.4 Conclusion**

We conclude that there is a significant lack of awareness of the financial situation by the Dutch consumer. The fact that the monthly balance between income and expenses is unknown for a large part of the households indicates that. An even larger group does not know whether they have built up enough pension to retire without financial troubles. We know

that a large part of that group will actually have financial troubles after retiring.

This unawareness becomes more concerning when taking into account the financial risks that consumers are exposed to. Losing income, high interest-only mortgages and insufficient resources (savings) to cover unexpected expenses can cause bigger problems in the future such as forced house sale. On the other hand a lot of opportunities are available that might not be utilized. Sustainable investments but also unused tax benefits and lowering mortgage interest can be very beneficial for households.

The increasing (high) debts have also been a big issue in the last years. As a large part of the households has risky debts, the number of debt assistance requests are increasing each year. Government policy aims to prevent the increasing of household debt. But there are still a lot of improvements to be made to decrease the number of households with problematic debt.

From this literature study on financial issues, we created a diagram (see Figure 3.5). This shows the relation between the several issues in perspective to the larger problem of a problematic financial situation. After reviewing the roots of the issues, we decided to focus on improving the **knowledge of the financial situation** and **financial planning**, shown in red in the figure. As a result of that, we will improve on the yellow colored issues.

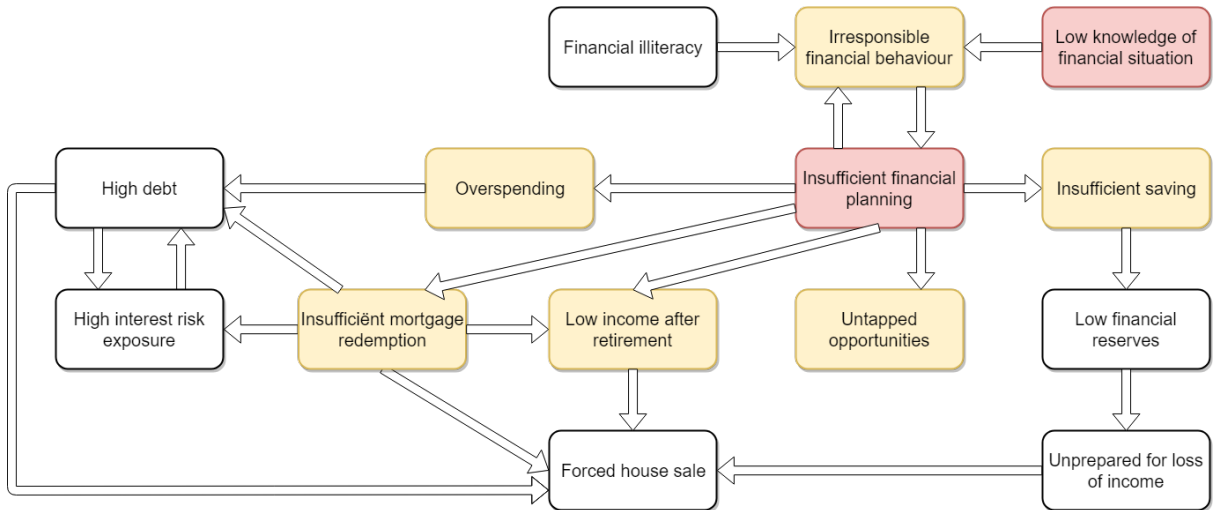


Figure 3.5: An overview of the problems and causes. We focus on the red colored issues and thereby improve on the yellow colored issues.

# Chapter 4

## Solution objectives: How to improve the knowledge and planning?

The main focus should be on **knowledge of the financial situation** and **financial planning**. In this chapter we will research ways to improve and motivate people to work on those issues.

### 4.1 Responsible financial behavior

To motivate responsible financial behavior, the elements of that behavior should be defined. In this section a description, based on literature, of responsible financial behavior is provided. This should be a guideline for the behavior we want to enforce.

[van der Schors and Warnaar \(2013\)](#) provides an overview of the five competences an adult must have to be financially self-reliant. *Someone is financially self-reliant when he makes informed choices in such a way that his finances are in balance, both in short and long term* ([van der Schors & Warnaar, 2013](#)). These competences are defined as follows:

- **Mapping.** The consumer has an overview of his finances in such a way that provides the possibility of keeping his finances balanced.
- **Responsible spending.** The consumer spends his income in such a way that his short term finances are balanced.
- **Looking ahead.** The consumer has an understanding that events and wishes have long term financial consequences and adjusts his spending behavior accordingly.
- **Consciously deciding on financial products.** The consumer chooses the financial products he uses based on his budget, and fitting to his personal and household situation.
- **Obtaining sufficient knowledge.** The consumer has to obtain all relevant knowledge to keep his household finances balanced in the short, mid-long and long term.

Specifically for the long term, [van der Schors and Warnaar \(2013\)](#) constructed a cycle of five steps to ensure that the consumer stays financially self-reliant in the long term. See [Figure 4.1](#) for a schematic overview of the usage of these five steps.



Figure 4.1: Cycle of five steps that ensure financial self-reliance in the long term ([van der Schors & Warnaar, 2013](#)).

- **(Re)setting goals.** The consumer decides which wishes he has and realizes what risks he faces at unforeseen moments in the future.
- **Mapping of the current situation.** The consumer has an organized financial administration which can be used to provide insight in the possible consequences of a certain scenario.
- **Creating an overview of the financial situation in the future.** The consumer makes an assessment of his future income, expenses, assets, and debts given a certain scenario.
- **Obtaining insight in the future.** The consumer is aware of his financial situation in the future for a given scenario. He knows which deficits might occur and how he can mitigate those.
- **Making choices.** The consumer considers several financial possibilities or products based on his personal situation and the characteristics of the product, and makes a decision based on these considerations.

[Retzmann and Seeber \(2016\)](#) recommend several competence areas in which financial education should teach competence:

- **Decision-making and rationality.** Consumers should be able to decide rationally between different options and actions given constraints such as budget or creditworthiness. They should be able to anticipate the consequences of the possible options and

evaluate them according to their own preferences, in order to select the option with the best effect on their financial well-being.

- **Relationship and interaction.** Consumers should understand that economic transactions are the exchange of good or services where both parties benefit from. They should be able to understand the interests of both parties involved and analyze whether those interest are conflicting. They should be able to identify the actions of both parties and understand the consequences of those actions. Also they need to know the formal and informal rules of these economic relationships.
- **System and order.** Consumers should understand economic interrelationships and their systemic effects. They should be able to explain pricing in different markets, and analyze the economical conditions for markets to be efficient. They should understand the effect of markets, regulatory systems and the relationship between the financial markets and government. They should be able to relate the economic, social and ecological effects of government actions, and describe the economic consequences of income and asset distribution by markets on nations and society.

These competences and requirements provide a guide for the way consumers should behave. Based on these competences several guidelines can be set. The Nibud BufferBerekenaar (see Section 4.4) provides a guideline for a saving goal. Retirement should also be kept in mind when looking at behavior. During the working life, arrangements have to be made to ensure a sufficient retirement plan. Sufficient is in most cases defined as 70% of the income before retiring (Treur, 2018).

Yoong et al. (2013) defines financial capability as *the internal capacity to act in one's own best financial interests, given the socio-environmental conditions*, which is similar to the definition of financial self-reliance from Simonse et al. (2017). Yoong et al. (2013) developed a conceptual model of the factors that drive financial capability. They state several factors that do, or do not, contribute to financial responsible behavior (see Figure 4.2). Of course financial literacy influences the behavior. But the behavior is also influenced by personal preferences and attitudes, general decision-making capabilities, and self and situational awareness. They also mention constraints that could negatively influence responsible behavior, such as societal and environmental constraints, but also the (lack of) financial resources.

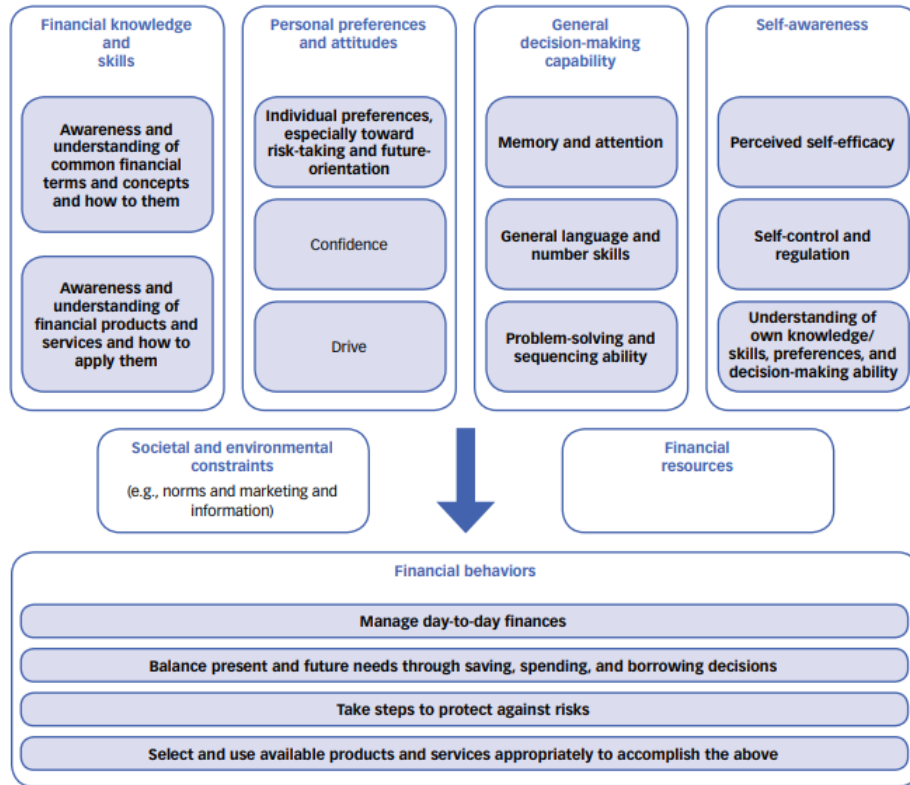


Figure 4.2: A conceptual model of financial capability (Yoong et al., 2013).

## 4.2 Nudging

Nudging can be useful to stimulate preferred behavior. In behavioral economics the concept of nudging is defined as *gently encouraging people to make choices that are likely to benefit the chooser and society in the long run* (Kroncke, 2018). The emphasis lies on *gently*, because nudging requires that freedom of choice is preserved. Nudging is often used by policy makers as a (better) alternative for enticements or enforcements such as tax benefits, subsidies or excises. Nudge theory is based on research on cognitive biases and dysfunctions that cause us to make bad decisions (White, 2017). The consensus is that choices (for example in retirement forms) can not be displayed in a neutral way, so policy makers have to be aware how the choices are presented and what the effect of the presentation is on the chooser. Nudges are *liberty-preserving approaches that steer people in particular directions, but that also allow them to go their own way* (Sunstein, 2014). For example, the choice of a default setting can have a large effect on the actual choice that the user makes. A study by the National Bureau of Economic Research indicates that a default setting of enrolling in a pension plan (opt-out) increases the participation rate by 25% (Beshears et al., 2008). This approach takes advantage of the laziness of people to nudge them into doing something that is right for them. These kinds of insights can be used to create better policy and predictions of economic behavior (Camerer & Loewenstein, 2004). Sunstein (2014) identifies ten nudges that are important for policy makers:

- **Default rules.** For example automatically enrolling in programs. The idea is that, unless the user takes active action to do the 'wrong' thing, the right choice is selected.
- **Simplification.** Complexity is a serious problem. It causes confusion and it creates



an additional barrier to participate in a program or product. Simplifying enrollment or regulation can greatly benefit participation and obedience.

- **Use of social norms.** Emphasizing the choices of (most) other people has a lot of influence. This information is most effective when it is as local or specific as possible. For example showing what the neighborhood chooses or what other people with the same income choose.
- **Increase in ease and convenience.** People tend to make the easy choice. *Resistance to change is often a product not of disagreement or of skepticism, but of perceived difficulty or of ambiguity* (Sunstein, 2014). So it is important to make the preferred choice easy and accessible.
- **Disclosure.** For consumers, the disclosure of important information can be very effective. For example, the environmental costs associated with energy use or the full cost of credit card payments can lead to a nudge into the desired and ‘best’ choice for the consumer.
- **Warnings, graphic or otherwise.** When serious risks are involved, a warning might be the best way to nudge people. The usage of large fonts, bold letters and bright colors can be effective. Warnings can counteract someone’s tendency to be (over) optimistic and educate them on the long term. However there is also a risk that people will discount the warnings and ignore them. In which case a positive message could have a larger effect (for example rewarding good behaviour). Research has shown that people react better to warnings when they are followed by steps to counteract the risks.
- **Pre-commitment strategies.** When people have certain goals, it is often useful to pre-commit to certain actions. For example when having the goal to stop smoking, pre-committing to a smoking cessation or program makes people more likely to act upon their goals. The effect is even higher when they have committed an exact moment in time when the action starts.
- **Reminders.** People generally tend to have a lot of things on their mind. When they procrastinate or are not taking certain action, a reminder can have significant impact. An example is a letter to remind you to register for organ donation.
- **Eliciting implementation intentions.** *People are more likely to engage in activity if someone elicits their implementation intentions* (Sunstein, 2014). For example asking whether they plan to vote or vaccinate their child can have significant effects. Emphasizing the previous actions (‘you have voted before’) can also be effective.
- **Informing people of the nature and consequences of their own past choices.** When data is available on a user’s own past choices, this information can help nudge people into making the right choices.

Nudges can be used to make people act or choose in a way that the *choice-architect* wants, without forcing their hand. This often helps preventing people to make, what is perceived as, a mistake. An example of such a mistake is with the choice of a consumer credit card. Warren and Bar-Gill (2008) claim that *consumers make systematic mistakes in their choice of credit products and in their use of these products. These observed mistakes indicate the existence of deficit in either information or rationality, or both.* They observed that many



consumers maintain a (high-interest) credit card debt, while having a cash balance of over \$ 2000. Nudging can effectively be used to help prevent these mistakes. [Smith and Zywicki \(2015\)](#) describe the largely positive change in consumer financing choices by requiring the issuers of credit cards to make interest rates and late payment fees clear and prominent in their offers. In this way consumers can better understand what they are signing up for.

### 4.3 Increasing financial responsibility and discipline

In literature there are several factors that help increase financial responsibility, discipline and self-control in general. See Figure 4.3 for an overview of the discussed literature. These factors could be implemented in a solution that improves financial responsible behavior and enforces discipline. Financial behavior consist of day-to-day money management, decisions about financial products and financial planning ([van Raaij & Sheva, 2016](#)). In this section an overview of factors that have shown, in literature, to improve this behavior will be discussed. These factors will be used as elements of the proposed solution.

		Financial responsible behaviour and self-control											
		Financial literacy and education	Knowledge of situation	Planning	SMART goals	Future perspective	Binding techniques	Monitoring and feedback	Self-efficacy	Solution Timing	Social comparison	Financial Advice	Partitioning Resources
Nibud	<a href="#">van der Schors (2017)</a>												
	<a href="#">van der Schors (2015)</a>												
	<a href="#">Mader (2015)</a>												
	<a href="#">Haws (2016)</a>												
	<a href="#">Simonse (2017)</a>												
	<a href="#">Brancati (2017)</a>												
	<a href="#">Newton (2015)</a>												
	<a href="#">Tomaskova (2011)</a>												
	<a href="#">Gerrans (2018)</a>												
	<a href="#">Wagner (2012)</a>												
	<a href="#">van Raaij (2016)</a>												
	<a href="#">Calcagno (2015)</a>												
	<a href="#">Locke (2002)</a>												
	<a href="#">Orlemans (2003)</a>												
	<a href="#">Wernsen (2007)</a>												
	<b>Total</b>	7	2	4	6	1	3	5	3	2	2	6	2

Figure 4.3: An overview of elements that aids financially responsible behavior improvement from literature.

#### Financial literacy and education

As stated earlier, financial literacy is a key influence in increasing responsible behavior and improving the financial situation. Education in financial literacy consists of knowledge and skills ([van Raaij & Sheva, 2016](#)). Knowledge of a concepts like interest, inflation and the value of money are key indicators of financial literacy and understanding those will improve financial

behavior. The impact of understanding the financial market is significant. [Wagner and Walstad \(2015\)](#) state that financial literacy and education will influence long-term behavior, but do not have immediate influence on the behavior. They state that *financial education can be a valuable contributor in shaping thinking that affect what people do to create a better financial future for themselves*. Several studies suggest that, even in advanced countries, people are still lacking in financial literacy ([Shen et al., 2016](#)). But increasing financial literacy alone will not be enough to improve the financial situation ([van der Schors et al., 2015](#)). Focusing solely on the transfer of knowledge will not lead to a change in behavior ([Simonse et al., 2017](#)).

## Knowledge of personal situation

Understanding the personal finances is the first step in keeping your income and expenses in check ([van der Schors et al., 2015](#)). Only 43% of the Dutch consumers check their bank balances weekly, update their administration monthly and make a yearly budget. Knowing your income, expenses and assets is vital in making payments and preventing overspending.

## Setting SMART Goals

Setting goals and making those goals Specific, Measurable, Acceptable, Realistic and Timely (SMART) is crucial in motivating people to reach their goals ([Madern & van der Werf, 2015](#)). Instead of a large goal such as ‘paying off all my debts’, a better goal might be ‘paying off 100 euros of my debt each month’. Specific goals tend to increase the effort people put in them. Also, making these goals more concrete can increase the effect of feedback as these are easier to measure. The goals should be challenging, but not too complicated ([Orlemans & Rijsewijk, 2003](#)). [Locke and Latham \(2002\)](#) stated that *the most difficult goals produced the highest level of effort and performance*. As it turns out most people do not have saving goals ([van der Schors & van der Werf, 2017](#)). Setting SMART saving goals could improve the success in saving for consumers.

## Planning

Financial planning can be defined as *a continuous process that aims at reaching wishes and goals of clients on the short and long term* ([Wernsen, 2007](#)). Making a plan and taking action in achieving the SMART-goals is a key part in self-regulation ([Haws, 2016](#)). Budgeting is a way of planning to reach goals, but other ways of planning also prove useful. For example, when trying to save on groceries, a shopping list could be a very effective tool for decreasing impulse purchases ([Haws, 2016](#)).

## Future perspective

When making goals and plans for the future, it is sensible to look at what outcomes the future could bring. This will help to motivate and refine plans ([Haws, 2016](#)). Focusing on benefits in the future has proven to increase self-control. People tend to act more on goals when they know what future trade-offs there are. For example spending too much now, will lead to not being able to retire early in the future.

## Monitoring and feedback

When goals are set, feedback on progression is necessary to maintain the motivating effect ([Madern & van der Werf, 2015](#)). People require *feedback that reveals progress in relation to their goals* ([Locke & Latham, 2002](#)). The reaching of (sub-)goals increases the belief that the larger goals are reachable, because of the small successes on the way. [Haws \(2016\)](#) states that reflection and behavior in the past influence present choices. For example, taking a fruit salad after an unhealthy meal to balance out the bad behavior. Furthermore, they state that the effect is only present when the past behavior shows successful self-control.

## Binding techniques

Use binding techniques to force people to keep agreements with themselves ([Simonse et al., 2017](#)). Scheduled money transfer to a savings account, or paying the deductible excess of the health-care insurance in monthly terms, are examples of binding techniques ([van der Schors et al., 2015](#)). In this way people are forced to live by their plans and thus are more likely to succeed. Larger expenses, re-framed as a smaller monthly expense, can make a large expense seem like something that can be handled right now ([van der Schors & van der Werf, 2017](#)).

## Increasing self-efficacy

Self-efficacy, or the belief in your own capabilities, is necessary in changing behavior. Increasing self-efficacy can be achieved by simplifying complicated choices and structuring tasks in smaller steps ([Simonse et al., 2017](#)). For example, decision or comparison tools can have a large impact in getting the user to take action on their financial situation. Those tools make it easier for the user to get an overview of the task at hand.

Another example can be MijnPensioenOverzicht.nl, which gives the user an easy tool that helps in providing an overview of their current collective pension products. [Locke and Latham \(2002\)](#) notes that self-efficacy enhance commitment to goals, and that adequate training, role models and persuasive communication can raise self-efficacy.

## Solution timing

Solution timing, or delivering the solution at the correct moment and in the correct way, helps to improve the impact of solutions. The impact of the solution can be increased by connecting to the current behavior, preferences of the customer or target group, and delivering the information at the right moment ([Simonse et al., 2017](#)). For example, before a significant life event, such as marriage or retirement, people often make important financial decisions. At that moment the impact of a solution is the highest.

## Social comparison

Social comparison can contribute to making the right decisions ([Simonse et al., 2017](#)). People are continuously influenced by the behavior of people around them. So showing them what most people do, or what others have done, can trigger people. Comparing people to others drives the incentive to improve. [Haws \(2016\)](#) states that even the presence of others makes people less likely to act on their desires and reinforces major goal violations. The accountability to another person enhances self-control.

## Partitioning resources

Partitioning resources will lead to more controlled spending. For example creating different accounts for different types of expenses will lead to more aware spending. This coincides with knowledge of spending behavior. *Partitioning one's savings goal into more specific categories led to higher savings rates and small resource accounts (money in wallet), rather than larger accounts (money in the bank) decreases consumption* (Haws, 2016). In the Netherlands, the usage of resource partitioning has decreased. In 2012 26% of the households had different accounts for different types of expenses, in 2015 this number had declined to 17% (van der Schors et al., 2015).

## (Professional) financial advice

Financial planning and advice from a financial advisor has proven to be very beneficial (Newton et al., 2015). Not only for wealthy clients, but also for people that are just getting by, a lot of benefits are associated with making a professional financial plan and getting advice (Madern et al., 2015; Brancati et al., 2017). A small pilot study concluded that financial advice has positive effects on clients' control of their finances, stress levels, comfort in their financial situation, preparedness for contingencies, and the amount of effort they put in their financial affairs (Newton et al., 2015).

Furthermore, from the main survey Newton et al. (2015) conducted at two time-points (2012 and 2014), it can be concluded that the financial planning process and financial advice had positive effects on financial and general well-being. Especially long-term clients experienced positive effects and were more likely to have good knowledge on financial matters and understanding of regulatory issues. This suggests that financial planning plays a role in developing awareness of financial issues. Also the research indicates that clients of financial planners *viewed their financial situation as impacting a range of areas of their lives, including financial well-being, physical well-being, mental health, and family and social relationships and activities*. The majority of the clients stated that financial advice has made a positive contribution to their financial well-being, sense of security, sense of control and peace of mind.

Similar results can be found in a study on consumers in the United Kingdom (Brancati et al., 2017). In their analysis of more than 90,000 household interviews, they found that a lot of benefits can be gained from finding financial advice both in financial results and in behavioral change. When looking at the group indicated as 'just getting by', those who received financial advice were 9.7% more likely to save, 10.8% more likely to invest in the equity market, they earned 19% more, and accumulated on average 39% more wealth compared to those who did not seek advice.

## 4.4 Existing software solutions

This section shows several existing solutions that try to improve the financial situation and awareness for consumers. These solutions will be discussed and linked to the elements discussed in Section 4.3.

## Peaks

Peaks is a FinTech startup currently funded by Rabobank (Peaks, 2018). Peaks is an investment app that links to people's bank accounts and gives the possibility to round up payment transactions and use that money (change) to invest in a predefined portfolio. Using that round up strategy the user automatically saves his change and invests it in a predefined risk category ranging from low to very high risk. Peaks' goal is to activate people to start investing, but using this strategy the app also helps people to save small amounts every month without a significant impact on their monthly spending habits. Currently the app only works with Rabobank accounts, but when the PSD2-standard comes into effect (see the section on that below) more banks will be supported.

Peaks is a good example of the usage of binding techniques. It combines automatic saving of the user's change with investing. This has several positive effects. The first effect is that money is saved instead of spent. The second one is that users get involved with financial products and investing, which increases financial literacy in the long-term.

## Rabobank: Extra Inzicht

Extra Inzicht is a tool developed by the Rabobank that provides insight in income and spending behavior (Rabobank, 2018a). It links with bank accounts and classifies all transactions in categories. An algorithm classifies most transactions automatically, but the user can provide input as well. After classifying the transactions, several graphs display the income and expenses of the user up to a 12 month period. The user can also create budgets and saving jars to structure spending habits. The tool provides an easy way to gain insight in expenses and income, and provides guidance in structuring spending patterns. It helps with partitioning resources and budgeting, and gives the possibility to monitor spending and saving goals.

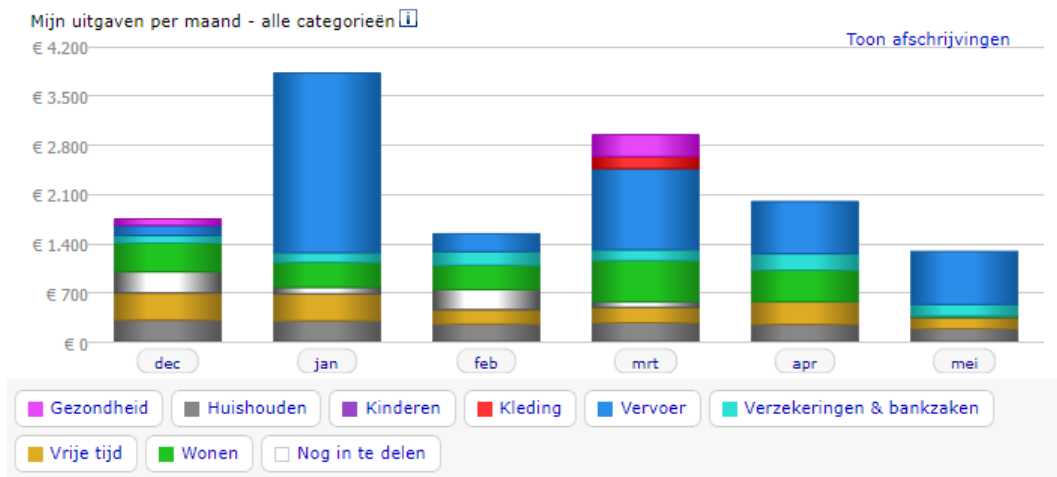


Figure 4.4: *Extra Inzicht* shows spending patterns divided into categories (Rabobank, 2018a).

## Monli Hypotheek Straks

Monli Hypotheek Straks is a web-tool developed by Topicus<sup>1</sup>. Topicus develops several checklist and plan generators within the Monli platform. This tool provides the user with an indication of whether they will be able to pay off their mortgage after retirement. It takes into account mortgage, income, pension, retirement age, and interest to calculate whether the interest-only part of the mortgage can be paid off with a new mortgage after retirement. If that is not the case, it provides suggestions about how the user can solve this problem. In most cases with additional redemption on the mortgage. Figure 4.5 shows a mortgage calculation by Monli. This tool helps users with knowledge about their mortgage situation and also suggests a plan for improving the situation. It also educates on mortgage redemption.

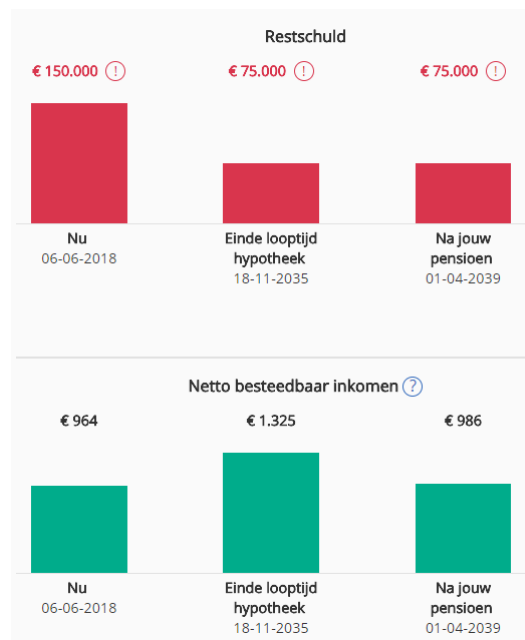


Figure 4.5: A result of the calculations performed by *Monli Hypotheek Straks* (Monli, 2018).

## Nibud BufferBerekenaar

The BufferBerekenaar is a tool created by Nibud that provides consumers a guideline for the amount of money they should save. It takes into account monthly expenses and income, but also health insurance, maintenance costs of the house and cars, and other unexpected expenses. Based on the user's input, a target number for the user's savings buffer is calculated (van der Schors & van der Werf, 2017). However, the tool does not provide a plan or guide how to achieve the calculated saving goal.

## YNAB: You Need A Budget

You Need A Budget (YNAB)<sup>2</sup> is an online software platform that enables users to budget their income. The idea behind the application is that you give every euro a job, in the form

<sup>1</sup>At the end of 2018 the Monli product label has been discontinued and taken down by Topicus for strategic reasons. Topicus currently has a similar product called Vé that is been deployed at several customers instead of under its own label. So the functionality still exists.

<sup>2</sup><https://app.youneedabudget.com>

of a spending category, when it comes into your bank account. Everything you spend is categorized in the same categories. Using this way of categorizing money streams, you can find out where your money goes, and plan for future expenses by saving each month in a certain category. For several foreign payment and bank services, YNAB offers an automatic import of the users transactions. For Dutch banks, this has to be done manually via a Comma Sperated Values (CSV) export.

## Dyme.App

Dyme.App<sup>3</sup> is a smartphone app that uses your bank transactions to create an overview of your fixed costs and subscriptions. It also provides a service of canceling the subscriptions on behalf of the user. Currently it links with the major banks (ABN Amro, ING and Rabobank), as well as some other payment providers and smaller banks.

## 4.5 Conclusions

From literature a lot of elements that assist in promoting financially responsible behavior can be identified. Figure 4.3 provides an overview of the elements discussed in this chapter. It can be concluded that there are a lot of elements that help people improve their behavior and activate them to improve their financial situation. It starts with knowledge, general knowledge about the financial market and products, and specific knowledge about the personal situation. After knowing that, (Specific, Measurable, Acceptable, Realistic and Timely (SMART)) goals and plans can be made. Using several elements such as binding techniques, partitioning resources, showing future perspectives, increasing self-efficacy and social comparison the user can be motivated to keep to the plan they have set out. The combination of these elements will provide guides to create a software solution that assists users in getting their finances in order and securing their financial future.

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<sup>3</sup><https://dyme.app>

# Chapter 5

## Solution alternatives

After investigating the problem and elements that promote financially responsible behavior, the process of designing a solution starts. We created several solutions ideas ourselves, and organized a brainstorm session with Topicus employees from several disciplines (designers, app and front-end developers). This brainstorm yielded several options for potential software solutions. All solutions were scored on several characteristics and finally the best one was selected for further development (see Section 5.4).

### 5.1 Solution requirements

The proposed solution has several goals, defined by the problem itself and Topicus. The main goal for the solution is to **activate, motivate and help the user to become financially self-reliant and behave financially responsible**. When looking at the elements of financial self-reliance, the following goals or features can be defined:

- Provide the user with insight in the current financial situation.
- Help the user to balance his income and expenses.
- Provide the user with a structured plan to improve the financial situation.
- Help the user in choosing and using, financial products and investment options.

The secondary goals are provided by Topicus. The solution should:

- Include a viable business model.
- Be affordable to implement.
- Fit within the vision of Topicus. This means that the solution should have a (social) impact.
- Fit within the current portfolio of Topicus.

### 5.2 Group brainstorm

To gather some out-of-the-box ideas and solutions, we organized a group brainstorm with 8 Topicus employees. First, we gave a small presentation containing the outline of the problem



and a brief overview of our findings so far. We also provided a persona (Diederick, see Appendix A) to give the brainstorm-team an idea of the target group for this product. Subsequently we filled out a product vision board based on a modified version of the Value Map proposed in Osterwalder et al. (2014). We used this board as a structured way to generate solutions. The board was filled in four steps:

- **Audience.** We think about what defines the target group of the product. We used Diederick as the audience, and brainstormed about what would be going on in his life. What are his struggles, goals, ambitions and hobbies?
- **Needs, or Pains and Gains.** We think about what the audience needs. What are the problems that our solution is going to fix? And what can be gained from using our solution?
- **Product Features.** We think about which features our product has that provides in the needs of the audience.
- **Value.** We think about the value our product creates for the audience. Unfortunately, due to time restrictions we did not cover this part in our brainstorm session.

After we filled out this board (see Figure 5.1, or Appendix B), several ideas emerged, which were developed in separate groups. These, mostly gamified, ideas are discussed in this section.



Figure 5.1: The filled out product vision board after the brainstorm session. The written result can be found in Appendix B

### 5.2.1 The Financial Game of Life

The Game of Life (or Life) is originally a board game in which the player travels through his life and makes life choices (marriage, jobs, children, etc) along the way. The proposed solution is a digital version of that game by which the game character starts out with the current (financial) situation of the player. During the game the player becomes aware, in a playful way, of the implications of his current finances and the effect of choices made during the game. We link a source of information on his real-life financial situation to this game (for example PSD2 discussed in Section 6.2). In this way we can make a connection between

the game and his reality. For example, when the player has a financial setback (his washing machine has broke down) he also experiences a set back in the game. The challenge of this approach is to keep a balance between the educational character of making people financially self reliant, and the fun aspect.

### 5.2.2 Escape Room

An escape room that enables the player to make financial decisions which influence his escape. The player gets a flow of money which he can spend on certain options. Each (good) decision gets him closer to the *escape*. But if he makes enough bad decisions, he will not be able to escape at all. This game should teach what the effect of financial choices are, and what financial responsible behavior is. But we doubt it will have a large effect on the actual life choices people make as it does not confront the player with his own financial situation.

### 5.2.3 Holiday Savings App

An app that enables a group of friends save for their joint holiday. Every participant regularly deposits money in the group (bank) account. During the course of the saving period, the app shows what kind of holiday can be bought from the saved amount. In this way, with every deposit, the holiday improves instantly. This gives the players of the game positive feedback on their healthy financial actions. First showing an (for example) empty tent in the rain, and slowly upgrading to a nice hotel with cocktails on the beach. This should teach the users the effect of savings while also providing the possibility for a business model (selling the actual holiday). As a downside is that the effect might be very limited in achieving actual financial self reliance. Also, an issue is to make the app fair in a way that every player deposits the same amount of money.

### 5.2.4 Facebook Quiz

An online quiz on Facebook asks a set of simple questions on the user's financial situation. These questions provide a way of determining the user's current financial situation, and whether he is financially self-reliant. After the quiz, the user gets his result in a playful way (for example 'What financial future do you have?') and has the possibility to share it on the platform. Hopefully, this will activate others participate as well. After the initial quiz, it is possible to do a follow up in the form of another application ('We can help you improve your financial future, please go to ...'). Especially for users that did not score very high. In this way the quiz can very well be used as marketing for another solution. A downside that emerged in the brainstorm, is that people already have privacy and trust issues with Facebook, so sharing your personal finances might be too intrusive to ask.

## 5.3 Solution alternatives

After the brainstorm, we concluded that the solutions we found were not exactly what we were aiming for. The ideas are fun for the user and out-of-the box, but we doubted the lasting impact of the proposed ideas. So we developed two options based more on the data we could use (see Section 6.2) instead of the fun and gamification factor.

### 5.3.1 Option 1: Online Personal Finance platform

Currently the Topicus Monli platform has several quick checks that provide users the possibility, by answering several questions, to check whether they might have a financial problem. Monli Hypotheek Straks (see Section 4.4) is an example of such a quick scan. But there are several disadvantages to that approach:

- The user has to fill out the same information multiple times.
- The user only gets answers to questions he has asked himself. As the problem is partly caused by a lack of awareness, we should also identify problems that the user is unaware of.
- It is a snapshot of one moment in time. There is no checkup or monitoring after the check. So if the problem worsens, there is user action required to notice it.
- The solutions (sometimes) have a lack of a structured plan to solve the problem. Most solutions only determine the presence of a problem, and provide little help in solving it. We already concluded that to successfully solve a self-discipline related problem, planning is very important.

So in terms of user experience there are a lot of improvements to be made. For every check the user has to take action. There are a multiple opportunities to improve and expand the platform by establishing a long-term link with the user. When the information provided by the user is stored, the usability of the platform can be improved. When, at some point in the process, the user links its bank account (PSD2) and other information (Ockto), these data sources can be used for further and automated checks for problems and opportunities.

The proposed solution builds a long-term relationship with the user. The user receives (constant) feedback on its financial situation, which possible problems and opportunities arise and how he is progressing in solving problems or improving his financial situation. The financial situation of the user is scored, and compared to others. The user slowly builds his profile, and the more information he provides, the better, more personalized, feedback he receives. While building the user profile, the user receives more useful feedback and information. This creates an incentive to keep using the application, provide more information and thereby improve the actual functioning of the application.

When enough information, on for example expense habits, is gathered, the user can be informed on smaller issues such as a high energy expenditure. In case of health insurance the user can be notified of an opportunity to increase his deductible excess, when the application notices that the user has no recent health issues.

This provides the opportunity for a business model. The platform could link with service providers and thereby propose fitting services to the user such as a cheaper energy supplier or fitting pension products to decrease the pension gap.

This solution could keep improving and expanding with every check and piece of 'financial intelligence' that is created by Topicus. The stored user data, combined with new insights and trends, could provide a basis for more and more intelligent suggestions and solutions for the user. This starts with checks for mortgage, pension and savings, but could also provide investment opportunities in the future. For example, the possible return on solar panels for

the user's house could be calculated and suggested as a profitable investment. This is an enormous improvement over the current Monli solutions, which requires that the user actively visits the platform every time a new check is developed.

There many possibilities and opportunities when deciding to build this platform. Below a prioritized overview of the ideas is provided, structured by the MoSCoW model ([Heerkens & van Winden, 2012](#)).

- Must haves:
  - Checks for known problems, and creating goals to solve them:
    - \* Mortgage redemption.
    - \* Sufficient pension.
    - \* Savings and assets.
    - \* Tax benefits.
    - \* Interest dependency.
  - Scoring of the current financial status:
    - \* Compare a user to the performance of similar users.
    - \* Provide insight in progress.
- Should haves:
  - Checks for possible opportunities in the above mentioned themes
- Could haves:
  - Simulating scenarios:
    - \* Loss of job or income.
    - \* Increasing interest.
    - \* Early retirement.
  - Pattern recognition:
    - \* Expenses above (Nibud) average (for comparable people).
    - \* Overview of recurring expenses such as subscriptions and insurances.
- Will not haves:
  - Advanced cash ledger.

This solution focuses on providing the user with information based on its own situation and motivating him by social comparison and feedback. This feedback can be immediate using the web application, or later via email (or another medium). Also gamification elements can be used, for example a progress-bar or a traffic light system for financial subjects can provide an additional incentive for the user to stay motivated.

### 5.3.2 Option 2: Spending App

The PSD2 payment data provide the possibility to actively provide feedback on payments to steer the user towards a balanced income and expense pattern. The idea behind this solution is to provide the user with continuous feedback on his financial actions. For example push notifications when irresponsibly spending is detected, or dividing expenses into several accounts and thereby creating a planned budget. Showing users the patterns behind their spending habits and scoring their current financial behavior should give them incentive to keep improving on that.

- Live insight in income and expense patterns:
  - Signaling irresponsible expenses.
  - Scoring weekly or monthly behavior.
- Encouragement of responsible behavior:
  - Setting weekly or monthly saving goals.
  - Feedback on progress of reaching saving goals.
  - Cash ledger with budgeting.

This solution provides a more gamified approach to your personal finances. Scoring and continuous feedback will motivate users and keep them engaged with their personal finances. The partitioning of resources will help them in getting control over their finances. But the downside of this solution is the fact that users have to use the solution continuously. There is some doubt whether all users of the target group are willing to commit to that.

## 5.4 Scoring characteristics

Up to this point there are 6 possible solutions to choose from. Together with Topicus, we scored each solution, within a scale of 1 to 10, on requirements defined in Section 5.1 and elements of a successful solution defined in Section 4.3. To each of these characteristics a weight is added which is defined together with Topicus. See Figure 5.2 for the result.

	Weight	The Financial Game Of Life	Escape Room	Holiday Savings App	Facebook Quiz	Personal Finance Platform	Spending App
Insight in the current financial situation	4	4	1	2	4	5	4
Balance income and expenses	5	3	1	1	3	5	5
Structured planning	3	1	1	2	1	4	5
Choosing and using financial products	3	2	1	3	3	4	4
Financial literacy and education	3	5	4	3	4	5	4
Monitoring and feedback	4	4	1	3	1	5	5
Increasing self-efficacy	4	1	1	4	1	3	4
Social comparison	3	4	3	5	4	4	4
Business model	4	2	4	5	3	5	4
Affordable to implement	4	2	4	3	5	3	4
Fit Topicus vision	5	4	4	2	1	5	5
Fit Topicus portfolio	2	4	1	1	2	5	3
Attractiveness to user	5	5	5	4	5	3	3
Score		3,2	2,5	2,9	2,9	4,3	4,2

Figure 5.2: Score applied to each solution.

## 5.5 Conclusion

From Figure 5.2 we can conclude that the Personal Finance Platform (PFP) is the best solution given the chosen characteristics. It helps users with balancing income and expenses, and provides accurate insight in the current situation. It also fits very well to Topicus vision and the current portfolio. Therefore this solution will be further developed in the course of this research project.

# Chapter 6

## Solution design: the Personal Finance Platform

In this chapter we discuss our designed solution. The solution in this phase of the research project has been developed with the expertise of the UX-design department of Topicus.

### 6.1 Features

The aim of the application is to create a platform that provides people with insights in their financial situation in an easy and fast way, and provide a solution to improve and measure the improvement of their financial situation. Possible issues will be displayed and the user will be given a way to act on those issues. The goal is to minimize the user's own effort, and therefore we want to use available data sources as an easy method to gather the required information.

The application gives the user an overview structured in the following six themes. For each of the themes several questions will be answered for the user. In the rest of this report we will refer to these questions as 'checks'.

1. Home and mortgage.
  - (a) Can the user stay in his house in the future (after retirement)?
  - (b) Is the value of the house on par with the height of the mortgage?
  - (c) Can the user benefit from refinancing their mortgage?
  - (d) Can the user benefit from extra repayments on their mortgage?
  - (e) Which risks does the user face when the interest rates increase?
2. Income and expenses.
  - (a) Are the user's income and expenses balanced?
  - (b) Can the user cut on some fixed costs? For example, selecting a cheaper energy or phone provider.
3. Tax benefits.
  - (a) Does the user have the right to claim or benefit from:

- i. Health-care benefits.
  - ii. Rent benefits.
  - iii. Daycare benefits.
- 4. Pension.
  - (a) Is the pension of the user high enough (70% of current income)?
  - (b) Which actions does the user have to take for early retirement?
- 5. Savings and capital.
  - (a) Does the user have enough savings/capital to cover unexpected expenses?
  - (b) Can the user benefit from investing a (possible) surplus in cash savings?
- 6. Loans and debt.
  - (a) Which debts does the user have?
  - (b) If the user has debt, is it possible to do extra repayments with surplus in cash savings?

In order to keep track of the progression (or regression) of the user, the application maintains a profile with all relevant user data. This data profile can also be used when the application develop releases new checks and features, that analyze the user data in a new way. When we obtain enough data from users, we can create a metric that compares users to other users and gives them information about how they are doing. Until then, we can use an Application Programming Interface (API) from Nibud, described in Section 6.4, to compare expenses and income to other consumers. How the data for the profile is gathered, is described in Section 6.2.

## 6.2 Data sources

Because the target group of this application is not actively involved in their own financial situation, their knowledge of their financial situation and therefore the information that they can provide us is limited. The goal is to minimize the user input, and use alternative sources of data to obtain a reliable and complete overview of the financial situation of the user. This also minimizes the effort a user has to put in the application, to obtain a useful result. And thereby make the application more attractive to use. In this section the used data sources will be discussed. At the end we provide an overview of all required data, and the source(s) they can be obtained from.

### Payment Service Directive 2

The new Payment Service Directive 2 (PSD2) provides the possibility to *Access to account* (XS2A) for Payment Initiation (PI) and Account Information Services (AIS) (Cortet et al., 2016). From a data retrieval perspective, the latter is the most interesting. It provides certified Third Party Providers (TPPs) *open and non-discriminatory* access to consumer's payment accounts. This should, when fully implemented, provide us with the possibility to access account balances and transactions, and use that information in this application. The user can authorize the TTP for access to their payment and transaction information for a



period of 90 days ([De Nederlandsche Bank, 2019](#)). However, currently the PSD2 legislation is not yet in effect in the Netherlands. But in the development and design of this product, we assume that it will be possible in the near future and that we will be able to use it in this product. ING already published<sup>1</sup> some API documentation that shows how PSD2 can be used.

## Ockto

Ockto is a software solution developed by Yellow Tail ([Ockto, 2018](#)). It is a system that allows the user to collect personal data from various sources, such as pension information and tax registrations, and send that via an API to a third party application. The following information is collected by Ockto:

- Family composition.
- Income.
- Expenses.
- Pension information.
- Assets.
- Debts.

In order to use Ockto, the user has to install the Ockto app on his mobile phone and scan a QR-code on the web page. The user can then authorize Ockto to gather the requested information from various government sources (such as the UWV and the Dutch Tax Authority) using the user's DigiD<sup>2</sup> login. Ockto then gathers the relevant information and delivers it to the application that initiated the session.

Ockto is used in multiple Topicus projects. A downside of the information provided by Ockto is that the data are often outdated. Most information comes from tax registrations, which are only filled in once a month or even once a year, and contain information of the previous year. So for continuous monitoring Ockto is not very useful.

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<sup>1</sup><https://developer.ing.com/openbanking/>

<sup>2</sup><https://www.digid.nl/>

## Data overview

Figure 6.1 provides an overview of the data that can be obtained from the discussed data-sources.

Mortgage	User input	PSD2	Ockto
Rent or own house	Yes	Maybe	Yes
Value of house	Yes	No	Yes
Original mortgage debt	Yes	No	Yes
Current mortgage debt	Yes	No	Yes
Current mortgage interest rate	Yes	No	Yes
Penalty free repayment	Yes	No	No
Monthly repayment	Yes	Maybe	No
<b>Income and expenses</b>			
Monthly income	Yes	Yes	Partly
Monthly expenses	Yes	Yes	No
Recurring expenses	No	Yes	No
<b>Tax benefits</b>			
Current benefits	Yes	Yes	Partly
Birthdate	Yes	No	Yes
Country	Yes	No	Yes
Partner or roommate?	Yes	No	Only partner
Joint income	Yes	Maybe	Partly
Children (with birthdate)	Yes	No	Yes
Daycare	Yes	No	No
Employment	Yes	Yes	Yes
Student?	Yes	Yes	Maybe
Yearly income	Yes	Yes	Yes
Joint house (dorm / group house)	Yes	No	Maybe
Handicap	Yes	No	Maybe
Number of housemates	Yes	No	Yes
Monthly rent	Yes	Yes	Maybe
Capital	Yes	Partly	Yes
<b>Pension</b>			
Size current pension	Yes	No	Yes
Monthly pension deposit	Yes	Partly	No
<b>Savings and capital</b>			
Balance of savingsaccount	Yes	Yes	Yes
Value of other savings	Yes	No	Yes
<b>Loans and debt</b>			
Current value of loans	Yes	No	Yes
Interest rate	Yes	Maybe	No
Creditcard transactions	No	Maybe	No

Figure 6.1: Overview of the data-points that can be obtained from the discussed data sources

## 6.3 Checks

In this section we will discuss the checks in detail. We will discuss what they mean, and how they should be calculated or implemented.

### 1 - Home and mortgage

#### 1.a - Can the user stay in his house in the future?

Whether a user can maintain a mortgage in the future depends on his income and his redemption of the mortgage. [Monli \(2018\)](#) provides an easy way to calculate whether the pension can still be paid after retirement called *HypotheekStraks*. For our solution we use the API behind the HypotheekStraks page for the calculations. It needs the following input data:

- Current income (including partner).
- Income after retirement (including partner).
- The monthly mortgage costs, after retirement.  
This can be calculated using the current debt, the size of the redemption free loan-part, the mortgage end date and the interest rate.

In the future this feature could also calculate for more scenario's such as:

- Unemployment.
- Loss of partner.
- Divorce.
- Occupational disability and illness.

Topicus already developed a tool that executes this check based on user input instead of data (see [Figure 6.2](#)). The calculations that back that tool can also be used in our case, but than (mostly) backed by our data sources.



Figure 6.2: A screen capture from dashboard of the Topicus tool *Kan ik blijven wonen?*

### 1.b - Is the value of the house on par with the height of the mortgage?

The value of the house can be determined in several ways. For example taxation, by taking the last price for which it was sold, or by using the value of the tax authority. We decided to use second one. This is the so called Real estate tax value (WOZ-value) of the house ([Vereniging Eigen Huis, 2018c](#)). This will be compared to the current amount of mortgage debt to determine whether the house is on par with the current mortgage sum.

### 1.c - Can the user benefit from refinancing a mortgage?

Mortgage refinancing can only be beneficial if the interest rate on the new mortgage is lower than the current mortgage. But even then, the benefit can be lost by the repayment fee. That is a fee that the mortgage institution charges upon early mortgage repayment, and is a compensation for the interest payments that they will not receive. Most of the times the mortgage has a percentage that can be repaid without fee (for example 10%). To the remaining part the repayment fee applies. After calculating the costs (or refinancing fee), the refinancing structure can be defined. If the user has over-value in his house (house is worth more than the current total mortgage), the user can finance the refinancing costs from his new mortgage. In that case, the new mortgage becomes a (bit) higher than the old mortgage, but the monthly or overall costs can still be lower, due to the lowered interest rate.

[Woonfonds \(2018\)](#) shows an example of refinancing the mortgage. Using the Topicus Findesk mortgage advisory software ([Findesk, 2018](#)), these complex calculations can be done. With

the result of these calculations (see Figure 6.3) the benefit for the user can be expressed in the number of months it takes to earn back the refinancing investment.

Oversluiten

Huidige situatie

Huidige hypotheeksom

€ 200000

Huidige maandelijkse inleg/aflossing

€ 500

Boeterente bij oversluiten

€ 30000

Bereken

Huidige rentepercentage

% 5,00

Financieringskosten

€ 1500

Nieuwe situatie

Eigen bijdrage van klant

€ 0

Nieuwe maandelijkse inleg/aflossing

€ 500

Nieuwe rentepercentage

% 2,14

Nieuwe rentevastperiode (in maanden)

120

Berekening

Huidige hypotheeksom	€ 200.000	Besparing nieuwe rentevastperiode	€ 50.459
Verhoging door oversluiten	€ 31.500	Totale oversluitkosten	€ 31.500
<b>Nieuwe hypotheek</b>	<b>€ 231.500</b>	<b>Besparing totaal</b>	<b>€ 18.959</b>
Huidige hypotheekrente per maand	€ 833	Nieuwe hypotheekrente per maand	€ 413
Huidige maandelijkse inleg/aflossing	€ 500	Nieuwe maandelijkse inleg/aflossing	€ 500
<b>Totaal huidige kosten per maand</b>	<b>€ 1.333</b>	<b>Totaal nieuwe kosten per maand</b>	<b>€ 913</b>
		<b>Bruto besparing per maand</b>	<b>€ 420</b>
		Terugverdientijd in maanden	75

Door over te sluiten worden uw bruto maandlasten € 420 lager. Hiervoor betaalt u eenmalig € 31.500.

Uw totale besparing na 120 maanden is € 18.959. Dit is gemiddeld € 158 per maand.

Afdrukken

Sluiten

Figure 6.3: An example of a refinancing calculation for a mortgage with an interest rate of 5% executed in Findesk (Findesk, 2018).

The following user data is needed for these calculations in Findesk:

- Current income (including partner).
- Current mortgage sum.

- Current interest rate.
- The repayment method of the mortgage.
- The fixed interest period.

At this moment, Findesk does not have an API for these calculations, so the calculation capabilities of Findesk can not yet be exposed to another application. This has to be implemented for our solution.

### 1.d - Can the user benefit from extra repayments on their mortgage?

With the low interest on saving accounts, doing extra repayments on the user's mortgage can have a higher return on investment than just leaving it at the bank. So in the case of a saving surplus (see Checks 5.a and 5.b), this can be beneficial. But due to the Dutch mortgage interest tax discount system, the mortgage interest costs can be discounted from the annual income in the tax calculations. This effectively lowers the net interest costs by upto 51% (see [Nibud \(2018a\)](#)). The effect of that tax discount has to be taken into account for this calculation. Also, as discussed above, there is a maximum to which the mortgage can be repaid, without a fee, each year. Figure 6.4 shows an example of the return on investment that can be gained from extra mortgage repayments with saving surplus.

Mortgage sum	€ 200,000.00	
Interest rate	5.0%	
Saving interest rate	0.35%	
Saving surplus	€ 10,000.00	
Repayment without fee	10.0%	€ 20,000.00
Tax percentage	51.96%	
<b>Current situation</b>		
Saving interest	€ 35.00	
Gross mortgage interest costs	€ 10,000.00	
Net mortgage interest costs	€ 4,804.00	
<b>After repaying the full surplus</b>		
Saving interest	€ -	
Gross mortgage interest costs	€ 9,500.00	
Net mortgage interest costs	€ 4,563.80	
Yearly return of saving surplus	2.05%	€ 205.20

Figure 6.4: Example calculation of mortgage repayment with surplus savings.

### 1.e - What risks does the user face when the interest rates increase?

The increase of an interest rate could be a large risk for the user, depending on the period for which the user has fixed his interest rate and the way (if at all) he repays his mortgage debt. Users with variable interest rates and an interest-only mortgage face a large and immediate risk of increasing interest rates. If this is the case, there should always be a warning from the platform.

But users who fixed their interest rate for a longer period could still face a large risk when interest rates increase. An example calculation is shown in Figure 6.5. The platform will warn the user if the rate for interest rate renewal is higher than his current mortgage rate.

This will be done well in advance of the ending of the mortgage rate period, so the user can prepare himself for the increase in mortgage costs.

Mortgage sum	€ 200,000.00		
Interest rate	€ 0.02		
Tax percentage	€ 0.52		
<b>Current interest costs</b>			
Gross mortgage interest	€ 4,000.00		
Net mortgage interest	€ 1,921.60		
<b>Increasing interest rates</b>			
New interest rate	€ 0.03	€ 0.04	€ 0.05
Gross mortgage interest	€ 6,000.00	€ 8,000.00	€ 10,000.00
Net mortgage interest	€ 2,882.40	€ 3,843.20	€ 4,804.00
Yearly gross increase	€ 2,000.00	€ 4,000.00	€ 6,000.00
Yearly net increase	€ 960.80	€ 1,921.60	€ 2,882.40
Monthly net increase	€ 80.07	€ 160.13	€ 240.20

Figure 6.5: Increasing mortgage costs with higher interest rates.

## 2 - Income and expenses

### 2.a - Are the user's income and expenses balanced?

Whether the income and expenses of a user are balanced could be measured by taking all expenses and income over the last months and subtracting them. But that would ignore irregular expenses that the user had reserved money for in previous periods. The recommended goal is to save 10% of the net income each year (Nibud, 2016), we can verify whether that is true for the last months or year. This provides a good indication whether the user's spending is balanced.

### 2.b - Can the user cut on some fixed costs?

The user may face several fixed costs such insurances, subscriptions and rent. Nibud (2018b) provides an API that gives reference amounts for several types of fixed costs. See Section 6.4 for further discussion of the API. These fixed costs can be compared with the costs the user is currently paying. These costs have to be detected from the user's payment transactions. We can recognize recurring costs by checking whether they occur monthly (or quarterly, or yearly). The categorization of the costs can be done by manually creating rules (e.g. a transaction to Nuon indicates energy costs), or by creating a test set and using machine learning to create a categorization algorithm. Invers (2018) provides a service that is able to enrich transactions, and classify them in spending categories.

When the fixed costs for different categories are known, we can compare them to possible cheaper alternatives. Currently there are several providers for comparison API's such as MoneyView (MoneyView, 2018) for financial products or Pricewise for energy, internet and insurances (Pricewise, 2018). Both these parties require a partner agreement, and are not available for free access.

### 3 - Tax benefits

The Dutch tax authority has various benefits that one can receive. The responsibility of applying and canceling the benefits lies with the receiver. So with every increase (or decrease) of income, and change in the situation of the receiver, he has to check which benefits apply. At the end of the year, when calculating the income tax, the tax authority recalculates the benefits, and any discrepancies will be corrected. This could result in an unexpected correction payment, because the receiver had, in hindsight, no right to receive those benefits. The following checks calculate for the user which benefits he should receive, and which he should not.

#### 3.i - Health-care benefits

Whether the user receives health-care benefits depends on (joint) income. The table presented in Figure 6.6 only applies to users older than 18. Based on the income of the user, we can look up in the table how much health-care benefits the user should receive. This table changes each year.

Yearly income	Without partner	With partner
€ 20,500.00	€ 99.00	€ 192.00
€ 21,000.00	€ 98.00	€ 192.00
€ 21,500.00	€ 92.00	€ 186.00
€ 22,000.00	€ 87.00	€ 180.00
€ 22,500.00	€ 81.00	€ 175.00
€ 23,000.00	€ 75.00	€ 169.00
€ 23,500.00	€ 70.00	€ 164.00
€ 24,000.00	€ 64.00	€ 158.00
€ 24,500.00	€ 58.00	€ 152.00
€ 25,000.00	€ 53.00	€ 147.00
€ 25,500.00	€ 47.00	€ 141.00
€ 26,000.00	€ 42.00	€ 135.00
€ 26,500.00	€ 36.00	€ 130.00
€ 27,000.00	€ 30.00	€ 124.00
€ 27,500.00	€ 25.00	€ 118.00
€ 28,000.00	€ 19.00	€ 113.00
€ 28,500.00	€ 13.00	€ 107.00
€ 29,000.00	€ 8.00	€ 102.00
€ 29,500.00	€ 2.00	€ 96.00
€ 30,000.00		€ 90.00
€ 30,500.00		€ 85.00
€ 31,000.00		€ 79.00
€ 31,500.00		€ 73.00
€ 32,000.00		€ 68.00
€ 32,500.00		€ 62.00
€ 33,000.00		€ 57.00
€ 33,500.00		€ 51.00
€ 34,000.00		€ 45.00
€ 34,500.00		€ 40.00
€ 35,000.00		€ 34.00
€ 35,500.00		€ 28.00
€ 36,000.00		€ 23.00
€ 36,500.00		€ 17.00
€ 37,000.00		€ 11.00
€ 37,500.00		€ 6.00
€ 38,000.00		
€ 38,500.00		

Figure 6.6: Monthly health-care benefits for 2019 ([Belastingdienst, 2018a](#)).



### 3.ii - Rent benefits

Rent benefits require that the receiver complies with the following rules ([Belastingdienst, 2018b](#)):

- The user pays rent.
- The user is over 18 years old.
- Yearly income is below €22.400 without partner, or €30.400 for joint income.
- Capital is below €30.000 without partner, or €60.000 for joint income.
- The rent is below €710,68, or €417,34 if the receiver is below 23.
- The user rents a private living space.

Except for the last requirement, all these data points can be extracted from the data sources mentioned in Section 6.2. The last requirements should be asked to the user directly.

### 3.iii - Daycare benefits

The daycare benefits provide parents with the possibility to receive part of the daycare costs for their children. Everybody who brings his children to the daycare center, while working, has the right to daycare benefits. The amount of daycare benefits that can be received is expressed as percentage of the actual daycare costs. The percentage depends on the joint income of the parents, see [Rijksoverheid \(2018\)](#) for the percentages. There is a maximum cost per hour that can be declared as daycare costs, and a maximum of hours each month that can be declared (230 hours per month) ([Belastingdienst, 2018c](#)). In the application we need additional information that can not be obtained from the data sources:

- The type of childcare, either day care or after-school care.
- The cost of per hour.
- Whether the daycare is with a childminder or a daycare center.

In the application we ask the user these questions (when applicable) and use the calculation of website of the Dutch Tax Authority ([Belastingdienst, 2018d](#)) to actually calculate the amount of benefits the user can receive.

## 4 - Pension

Pension calculations are quite complex. From Ockto we can see what the user has currently built up in various employer pension funds and an indication of the future pension from those funds. But for a full overview of the income after retirement, the government pension (AOW) payout at retirement and the payout of possible private pension arrangements have to be known. For now we leave private pension arrangement out of the solution. For the government pension we need additional data, namely the number of years that a user and his partner have worked outside of the Netherlands. Topicus already developed an API that can be used to calculate the actual monthly gross and net income based on government and employer pension(s).

#### **4.a - Is the pension of the user high enough (70% of current income)?**

After the total payout at retirement age is calculated, we can use an estimation of the income at retirement to determine if the expected pension is sufficient. If that is not the case, we can use a similar approach as described in the following section to close the gap between the expected and the required pension and advise the user to take action.

#### **4.b - What actions does the user has to take for early retirement?**

The age of retirement hugely affects the payout at retirement. Not only does the user have less time to contribute to his pension, it also has to be spread out over a longer period. The government pension (usually) starts at a fixed age, based on the user's date of birth. The expected pension at early retirement is based solely on the collective and personal pensions of the user. 70% of the user's estimated income at that moment is defined as sufficient.

To advise the user what actions to take, we must determine the difference between the needed pension and the built up pension at the desired early retirement moment. Then we have to calculate and advise which personal pension product the user has to buy to close that gap (if any). For the calculations and suggestions, a possible partnership with an individual pension provider is possible.

### **5 - Savings and capital**

#### **5.a - Does the user have enough savings/capital to cover unexpected expenses?**

Nibud has set up an API (discussed in Section 6.4) that calculates the minimum buffer a user should have to cover unexpected expenses. We can use that buffer and compare it to the current capital of the user to see whether they have their savings on par.

#### **5.b - Can the user benefit from investing a (possible) surplus in cash savings?**

As discussed before in Section 3.2.7, there are multiple investment options ranging from financial investment products to pension plans and home improvements. For this check, a database that contains various investment options will guide the user. Some investment options have strict criteria, such as a minimum deposit amount. Others are only applicable to home owners with certain house properties (such as roof angle, or isolation). When possible, these criteria should be verified, and the options should not be shown if the criteria are not met. The options can be displayed to the user in a separate screen. The information that should be displayed should be:

- Return on investment, both in percentage and in monetary amount.
- Risk level (see Figure 6.7).
- Investment criteria, such as the house properties, or minimum deposit.
- Duration of the investment.
- Link to more information or purchase point.

<b>Growth product</b>		<b>Debt product</b>
<b>Very low</b>	Payment of deposit completely guaranteed	Repayment of debt fully guaranteed
<b>Low</b>	Payment of 80% or more of deposit guaranteed; <i>AND</i> GUISE percentage of 95% or greater	Repayment of 80% or more of debt <i>AND</i> GUISE percentage of 90% or greater
<b>High</b>	Less than 80% of deposit guaranteed; <i>AND</i> GUISE percentage of 90% or greater	Less than 80% of debt guaranteed; <i>AND</i> GUISE percentage of 80% or greater
<b>Very high</b>	GUISE percentage between 75% and 90%	GUISE percentage between 65% and 80%
<b>Extremely high</b>	GUISE percentage less than 75%	GUISE percentage less than 65%

Figure 6.7: Quantitative Risk Indicator from the Netherlands Authority for the Financial Markets (AFM, n.d.). The GUISE is an indicator of the average payout of an financial product in case of bad eventualities.

## 6 - Loans and debt

### 6.a - Which debts does the user have?

Ockto provides an overview of the outstanding debts that the user has. It is important to notice that not all debts are registered in Ockto. Without any other data sources, this overview is incomplete. So the user has to have the possibility to add debts that are not registered by Ockto.

### 6.b - If the user has debt; is it possible to do extra repayments with surplus in cash savings?

When the debt has the possibility of repayment, the repayment benefit can be calculated in the same way as discussed in Check 1.b. Often the benefit of extra repayments on loans are higher because of the higher interest rates and the absence of tax deduction. So when both mortgage and loan repayment is an option, the extra repayment on loans is preferred.

## 6.4 Technical design

This section describes the technical design and the global workings of the application. The application is built up in several parts:

- **Front-end**

The front-end is the web-application that the users see and interact with. It shows all relevant information and handles the user input.

- **Back-end**

The back-end communicates directly with the front-end, is used to facilitate all the processes, and communicates with the other parts of the application. The communication with the front-end, calculations and the connectors (discussed below) is done using regular REST API-calls.

- **Ockto-connector**

This part is responsible for the communication with the Ockto software. It imports the user data obtained by Ockto to the back-end.

- **PSD2-connector**

This part is responsible for receiving the PSD2 data. In practice PSD2 is implemented for each bank, so it is possible that an external service is used to facilitate the communication between our application and the individual banks.

- **Calculation and check module**

This part contains the main logic for the application. It executes the checks, and generates the text messages, compares the user to others and calculates the scores for the user. This part also calculates and derives all the needed variables. So for example, the user's monthly income will be derived from the PSD2-transactions.

- **Database**

This part stores the application and user data. We recommend to use a NoSQL-database, because this allows rapid prototyping and fast changing database schemes. It can be used to store and manipulate JSON objects, which are very flexible to use.

## External APIs

For several checks we will use some external APIs. We will use them to do calculation work and provide extra data that is already built by other parties and applications.

### Nibud BufferBerekenaar

Nibud published a tool called BufferBerekenaar<sup>3</sup>. Using this tool consumers can calculate a responsible buffer that they should have to cover their (unexpected) expenses. The API behind this tool can be used by our application to calculate how much savings a user should maintain.

### Nibud Persoonlijk Budget Advies

Nibud published a tool called Persoonlijk Budget Advies<sup>4</sup> that assists users budget their expenses. This tool also shows what a *comparable* household spends in a certain category. The API behind this tool can be used in our application to compare the users income and expense pattern to other consumers.

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<sup>3</sup><https://bufferberekenaar.nibud.nl>

<sup>4</sup><https://persoonlijkbudgetadvies.nibud.nl>

## 6.5 UX-design

Together with Topicus we created screen designs for the user flow through the application. Appendix C shows the full screen design for the user flow. In the screen designs we used several of the nudging techniques described in Section 4.2). We will discuss the design choices and elements of the design in this section.

### Financial situation

One of the main goals of the application is to provide users information on their financial situation. We tried to quantify the current financial situation in a way that the user can directly see the status of their situation. We decided to use stars, similar to how they are used in reviews online. This way should be familiar to our target group.



Figure 6.8: An indication of the status of the user's financial situation.

### Feedback on progress

When the user comes back to the application after not using it for a certain period, the user receives feedback on the progress he has made. We used a thumbs up, in case of improvement. And a thumbs down, in case of a deterioration of their financial financial situation.



Figure 6.9: Feedback on the progress a user has made on his financial situation.

### Comparison with peers

As a way of social comparison, we decided to compare the situation of the user with other users in a comparable financial situation. This should also bring some competitiveness into the application, as the user can now try to be the best among his peers. Figure 6.10 shows how we indicate how the user is doing compared to his peers.

Het meeste heb je op orde en je doet het beter dan **69 procent van de mensen** in een vergelijkbare situatie. Wel is ons opgevallen dat je nog wat toeslagen kan aanvragen en opzeggen. Hier kan je

Figure 6.10: The user will be compared to users in a similar financial situation.

## Default choice

When the user has to make a choice, for example decide whether they want to share their transaction, we try to nudge them to what we consider the best choice for them. We have done that by making the ‘best’ choice the most attractive one to choose. Figure 6.11 shows an example of how we made the best button the most attractive one to click on.



Figure 6.11: Make the best choice for the user, the most attractive.

## Color use

To show the urgency and impact of several checks and tips, we used different colors. We used a traffic light principle (green-yellow-red) as a color coding. We choose to to this because the user is familiar with the use of green for good, yellow for warning and red for danger or a problem. In our case, green means *good and no further action from the user is required*, yellow means *no direct problem, but possible benefits or future problems can resolved*, and red means *there is a direct problem, the user has to do something now*. Figure 6.12 shows the use of colors in the application.



Figure 6.12: The use of color to indicate the impact of certain problems and opportunities.

## Plan to improve

When confronting the user with potential issues, it is best to show them how to improve or solve them immediately (see Section 6.3). This can either be done by looking forward to the future, or by immediate action that has to be taken. In any case it is best to make the solution as concrete as possible. Figure 6.13 shows an example of that.



Figure 6.13: Provide the user with a plan to fix the given problem.

# Chapter 7

## Demonstration and evaluation

The final development step in the DSRM is the demonstration and evaluation of the design. In this chapter we discuss the evaluation and verification of the design. We chose to send out a survey to identify focus points for the design and verify a clickable prototype with several users.

### 7.1 Survey

After looking over the full design, we concluded that the amount of features to be implemented was too large to be implemented at once. Also, we would like to validate the user's needs and opinion on the feature list. We decided to send out a survey that asked the user for his opinion about whether the proposed checks (see Section 6.3) are interesting to him. We used a unmoderated closed card sorting survey, in which we created a card for every check in question form, and let the user place those in five predefined categories. [Sherwin \(2018\)](#) describes the process in more detail. We added four categories (from very *interesting* to *not interesting*) to measure the user's opinion, and added a fifth category in case the user does already know the answer to this question. The proposed questions were:

- Can I stay in my house after retirement?
- Is the value of my house on par with the height of my mortgage?
- Can I benefit from refinancing my mortgage?
- Can I benefit from extra repayment on my mortgage?
- What risks do I face when the mortgage interest rates increase?
- Are my income and expenses balanced?
- Can I cut fixed costs?
- Am I using a tax benefit to which I have no right?
- Do I have the right to a tax benefit which I am not receiving?
- What actions do I have to take for early retirement?
- Is my future pension high enough?

- Do I have enough savings to cover unexpected expenses?
- Are there interesting investment opportunities for my savings?
- Do I have irresponsible debt?
- Can I benefit from extra repayment on my debt(s)?

And they were sorted in the following categories:

- I find the answer to this question very interesting.
- I find the answer to this question interesting.
- I might find the answer to this question interesting.
- I do not find the answer to this question interesting.
- I already know the answer to this question.

We used Optimal Workshop<sup>1</sup> as an online tool to take the survey. We placed a pre-selection question to filter out people below 18 years old, because they do not fit in our target group. Then we asked some intake questions to be able to analyze our results based on characteristics (age, house ownership and education level) of the survey group. After the pre-questions the card sorting started, see Figure 7.1. After the card sorting, the user was presented with the opportunity to leave their contact information for the promotion action (see Section 7.1.1).

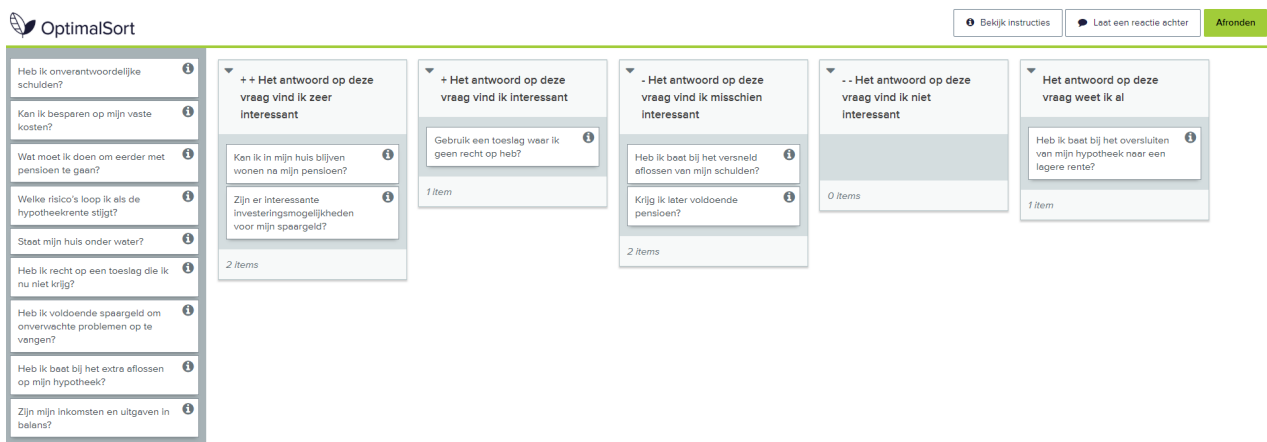


Figure 7.1: A screen shot of the card sorting part of the survey. The user has to drag the cards on the left to the categories on the right. See Appendix E for a larger version of this image.

### 7.1.1 Promotion

We opened the survey on 30<sup>th</sup> of November 2018 and closed the survey on the 17<sup>th</sup> of December. To ensure enough participants in the survey we decided to promote the survey on Facebook and connect a prize (50 euro Bol.com gift card) that was going to be raffled among the participants. Figure 7.2 shows the promotional advertisement post on Facebook. We decided to use the Monli Facebook page, that Topicus has used earlier to gather participants for

<sup>1</sup><https://www.optimalworkshop.com/>



their surveys. We used 50 euros on Facebook's advertisement platform and decided to target the advertisement to people from 25 to 65 years old, living in the Netherlands. After 4 days of running the promotion ad, we noticed that over 50% of the participants were between 18 and 34 years old. We decided to exclude that group from the target group of the advertisement to balance the participant group which resulted in more responses from older participants.



Figure 7.2: The Facebook promotional advertisement post.

### 7.1.2 Analysis

For the analysis we used Microsoft PowerBI (Microsoft, 2019). PowerBI is a tool that helps analyze data and presents it in a graphical way. The first step in the analysis was to remove the name and email address columns from the data-set. Then we translated the data points and column names to English. This resulted in the following columns:

- **Participant.** An anonymized participant id.
- **Age** The age of the participant.
- **Mortgage.** A field that shows whether the participant has a mortgage, rents a house or has another living situation.
- **Complete.** A field that indicated whether the participant completed the survey.
- **Education level.** The level of education of the participant.

- **Card label and index.** The cards that were sorted.
- **Category label.** The category that the card was put in.
- **Sorted position.** The position in which the card was placed in the category.
- **Start and finish time.** The time at which the participant started and finished the survey.

Each answer of a user is placed in one row, which is used by PowerBI for further analysis.

### 7.1.3 Results

After running the survey for 17 complete days, we got 71 participants that finished the survey. The distribution of the participants can be found in Figure 7.3. This resulted in 1065 sorted cards.

Age	Participants	% of total	Education level	Participants	% of total	Mortgage	Participants	% of total
18 up to and including 34	36	50,70%	HBO	25	35,21%	Yes	47	66,20%
35 up to and including 54	20	28,17%	WO	15	21,13%	No, I rent a house	21	29,58%
55 up to and including 64	14	19,72%	MBO	13	18,31%	No, other	3	4,23%
65 and older	1	1,41%	HAVO	9	12,68%	<b>Total</b>	<b>71</b>	<b>100,00%</b>
<b>Total</b>	<b>71</b>	<b>100,00%</b>	VWO	5	7,04%			
			VMBO	4	5,63%			
			<b>Total</b>	<b>71</b>	<b>100,00%</b>			

Figure 7.3: The distribution of the participants that finished the survey over age, employment and living situation.

Figure 7.4 shows the distribution of the answers of the categories. Note that one participant sorted all the questions to *I already know the answer to this question*. In total about 30% of the cards were sorted to *I already know this answer*, and another 20% was deemed *not interesting*. A total of 38% of the answers was either *interesting* or *very interesting*.

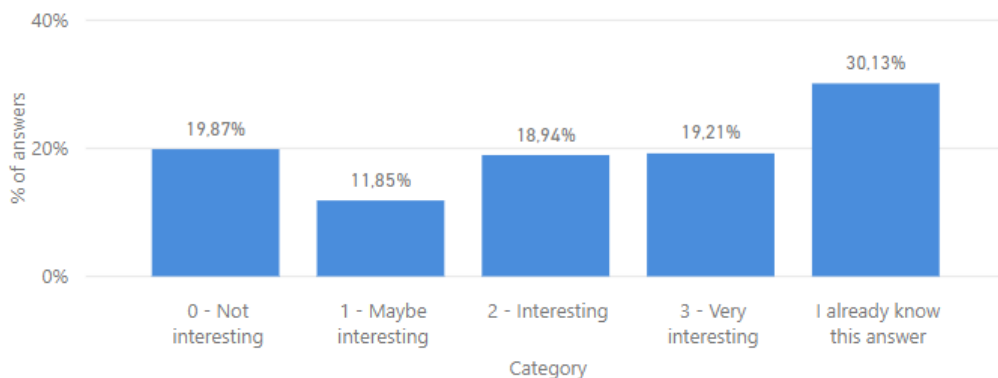


Figure 7.4: The distribution of the answers over categories.

The total result of the sorting can be found in Figure 7.5. In that figure, the percentage is based on the amount of participants that placed that particular card in that category. So for example 33.8% of the participants found that the *Can I cut on fixed costs?* card to be interesting.

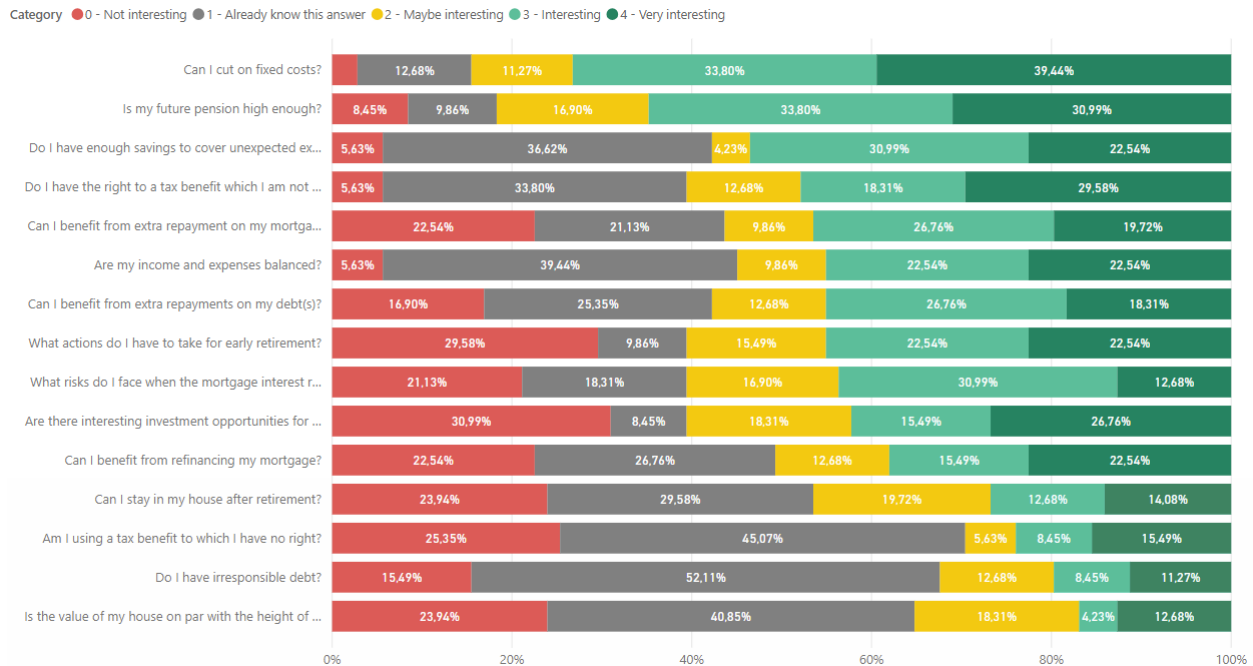


Figure 7.5: Results of the card sorting into categories. See Appendix F for a larger version of this image.

## 7.2 MVP prototype

To illustrate, demonstrate and test our application without having to implement the full platform, we created an Minimum Viable Product (MVP) prototype. This prototype shows the workings of three popular checks that can be implemented in a relative short amount of time. We decided that we will build the prototype with the following checks built in:

- Is my future pension high enough?
- Do I have the right to a tax benefit which I am not receiving?
- Do I have enough savings to cover unexpected problems?

This prototype will show how the user interacts with the system, what information he has to provide and what the result of the checks looks like. This prototype is built for one specific and predetermined flow with information from a fictitious user based on the persona Jan (see Appendix A). The prototype therefore does not support actual user input and calculations, but does support mouse clicks that simulate the act of interaction and providing information. The prototype is build using InVision (InVision, 2019), a cloud platform that enables you to build clickable prototypes based on visual designs. Using this prototype we will conduct some tests (see Section 7.3). The full prototype can be found online<sup>2</sup> and as a printout in Appendix D.

## 7.3 UX-test with the MVP prototype

Using the MVP prototype (see Section 7.2), we tested our product on five participants. We conducted a so called User eXperience (UX) test. Which means that you let subjects use

<sup>2</sup><https://invis.io/BQPXNF9P52N>

the prototype, and observe the user-experience of the test person while they do so. Using a UX-test it is possible to find faulty, unclear or irritating aspects of your prototype, but it also gives an indication of whether the subjects will use, and are willing to invest time into, your application in real life.

The main goal of the test was to understand whether the designed application actually helps users with their finances. This means that that they would use this application. And that the application actually helps them with their financial situation. These demands are very difficult to measure with actual test subjects as their answers may not always be truthful and applicable to a real world situation. The fact that the participants say that they find the product useful and would really like to use the application, does not necessarily mean that they will actually use the product. But their answers give us an indication of how the product is perceived by its potential users.

After reading the advice of [Nielsen \(2000\)](#) based on [Nielsen and Landauer \(1993\)](#), we decided to use five participants for our UX-test. According to that article, five should be optimal for finding usability problems in a small study. After the fifth participant most problems are already found and participants are going to repeat each other. Similar to the studies in the article, we selected five employees from Topicus that had similarities with our persona Jan (around the same age, preferably having children, see [Appendix A](#)) from various positions and departments within the company. Note that this kind of test does not give us any quantitative results, only a qualitative indication of the viability. Numbers and percentages can not be extrapolated to a larger population.

During the whole test, each participant and their screen actions are recorded. Next to myself and the participant, there was an objective observer present to note all the observations<sup>3</sup>. We gave each participant a scenario and an assignment that they have to execute on the prototype (see [Appendix G](#)). During the execution we asked the participants to think and motivate all their choices and actions out loud. We asked several questions during various moments in the test:

- After filling in the pension and tax-benefits pages:
  - Would you be able to supply this information instantly in a real world situation?
- At the Ockto page:
  - Do you understand how Ockto works?
- At the dashboard:
  - What actions would you take after looking at the dashboard?
  - Which information do you find useful?
- After the test:
  - Would you be prepared to provide us with the bank (PSD2) and government (Ockto) data?
  - Would you use this product yourself?
  - Would you like to be notified on your financial situation over time?

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<sup>3</sup>Notes and recordings can be supplied upon request.

### 7.3.1 Results

Each of the five participants gave us valuable insights into the possible problems and opportunities for the application. In this section we will discuss the main points that were raised by the participants. The end of each subsection contains some recommendations for further development of the application. Figure 7.6 shows an overview of the observations and answers per participant.

Participant	1	2	3	4	5
<b>Providing information</b>					
Too much text	Yes	Yes			
Wanted to skip PSD2	Yes	Yes	Yes	No (3)	No
Wanted to skip Ockto	Yes	No	Yes	No (3)	No
Ockto is too complicated / involved	Yes	No	No	No	No
What happens to my data?	Yes		Yes		Yes
Would be able to fill out this information instantly	No	No	Yes	Yes	Yes
<b>Dashboard</b>					
Would give information, knowing that this was the result	Yes	Maybe	Maybe	Yes (3)	Maybe
Useful result	Yes	Yes	Partial (2)	Yes	Yes
Understands problems and urgency	Yes	Yes	Yes	Yes	Yes
<b>Overall</b>					
Privacy and/or data concerns	Yes	Yes	No	No	Yes
Provide information if trusted publisher and application	Yes	Yes	Yes	Yes	Maybe
Would use this application		Cond (1)	Yes	Yes (3)	No
Errors in the text			Yes		
<b>Features and suggestions</b>					
Comparison over time	Yes	Yes	Yes	Yes	Yes
Saving the result (to PDF / print)	Yes	Yes			
More visuals / better		Yes			Yes
Specification of the numbers and calculations			Yes	No	Yes
1: If presented by a trusted party and I "stumble" upon it. Would not search for this application.					
2: Would like more information and more complete picture with income and expenses included					
3: Would do some research on the technique first					

Figure 7.6: An overview of the observations made in the UX-test.

#### Privacy and data concerns

In every case the participant experienced a barrier when asked to provide information. Three participants tried to skip the PSD2 step (unfortunately that was not possible in our prototype) and noted that in real life they would have skipped this option or would not use the application if skipping was not possible. Some participants stated that they were worried about not fully understanding what information was gathered and why that information was necessary. In hindsight several participants acknowledged that providing the payment information was indeed useful. They stated when knowing that this would be the result, they would have provided the information. Similar observations were made for the Ockto

step. One participant stated that he would like to enter mock data first to find out how the applications works, before providing, and linking to, his personal data.

Most participants noted that they would only use this application if they trusted the party behind it (for example a bank or the government). And one participant noted that he would not trust the techniques (PSD2 and Ockto) until he did some research on it. Several participants stated that they found it weird that Ockto requires another app instead of an in-application way of linking.

- **Clearly explain which information is obtained about the user and why that is necessary.** Users must understand the benefit of providing the information through a data-source. That would increase the probability of the user actually providing the information this application needs.
- **Build up trust.** Some participants stated that immediately providing payment data was quite intrusive. Building up the trust by first asking simple questions and providing instant results, should improve the willingness to provide data. To achieve this, the nudging techniques discussed in Section 4.2 could be useful.
- **Integrate Ockto.** Instead of requiring an app on a mobile phone, integrating it into the application itself is more convenient, and would likely increase the usage of Ockto.
- **Use a trusted label to publish the application.** For example partnering up with a bank or government organisation. That would increase the probability of the user using this application.

## Provided insights

Four of the participants stated that the information shown in the dashboard was useful to them. All of the participants understood what was the most urgent issue in their financial situation and would have acted upon that immediately. Some noted that information was too specific, the pension and savings information only showed numbers and not an explanation of the numbers.

- **Add foundation for calculations and numbers.** Two participants would have liked a specification for the numbers provided in the dashboard. For example the required savings and the future pension are without any explanation or specification. They noted that they would prefer the explanation to be a graphic (for example a bar or line-chart).

## Design

Participants had several issues related to the design of the application, not the actual functions. These were of course not optimized in the rapidly developed prototype and need further development.

- **Less and better structured text.** Several participants noted that some pages contain big pieces of text. They would like it to be more structured and less overwhelming. One participant suggested using bullet points and illustrations to make the information easier to digest.



- **Do not use stars as an indicator for financial health.** Two participants stated that stars are the wrong indicator to use when displaying financial health. They associate it with a review or judging something, instead of an indicator of financial health.

### Feature and use-case suggestions

During the test, several features and improvements were suggested by the participants:

- **Add a check for (double) insurances.** Using the current data this might be difficult, but for health insurance we can already make some suggestions.
- **Use this application in the debt counseling.** Provide the counselor an easy overview of the financial situation of their clients.
- **Add a share, save or print button.** Several participants expected that they could do something with the results in the dashboard. Adding a way to export the results, would give them the possibility to discuss their financial situation with others.

### Using the application

Two out of the five participants stated that they are likely to use the application. One stated that he would use the application, if he would stumble upon it and it was indeed as easy as this. But that he would not search or actively look out for a tool like this. Most participants stated that a part of the information was useful, but that they would know most of the things that came out of the application in their own personal situation. So for them the benefit of this application is limited. However, they could see that the provided information could be useful to others.

## 7.4 Conclusion

In this chapter we have shown one way of demonstration (see Section 7.2) and two ways of verifying the designed application (see Section 7.1 and 7.3). From the survey we can see which topics users find interesting, how many already know the answers and which topics are found uninteresting. Specifically fixed expenses, pension, savings, and tax benefits were found interesting. Using that knowledge we created a clickable MVP-prototype to showcase the functionality and provide us with a possibility to test the application on potential users.

The UX-test yielded mixed results. Though some users stated that they found the result useful, there were some privacy concerns and missing features. We can certainly conclude that the design needs to be improved, and that required features are missing. However, based on the survey and UX-tests there is potential for a viable application.

# Chapter 8

## Conclusions

### 8.1 Answers to research questions

This section provides a brief overview of the answers to the research questions and references to more elaborate answers found in this report.

#### **KQ-1: How do consumers currently handle their personal finances?**

Chapter 3 discussed how consumers are currently handling their finances. The main conclusion is that there is a significant lack of awareness of the financial situation by the Dutch consumer. This lack of awareness shows in different ways, some consumers do not know the monthly balance between income and expenses. A larger group does not know whether they have built up enough pension.

This unawareness becomes concerning when we consider the risks that consumers are exposed to:

- (Unprepared for) loss of income
- (High) interest-only mortgage with insufficient repayment
- Insufficient financial reserves
- Low income after retirement

This all could lead to larger problems such as forced house sale and increasing (problematic) debts. Current data show an increase in debt assistance request, which shows that the problematic debt under consumers is increasing.

#### **KQ-2: How should consumers responsibly handle their personal finances?**

Section 4.1 discussed what responsible financial behavior should be. In the previous research question we concluded that the main problem is an unawareness of the financial situation that exposes consumers to unwanted and unexpected risks. Solving this unawareness, and becoming financially self-reliant is key in responsibly handling personal finances. Several studies describe ways to improve the financial situation and become financially self-reliant. This means that the consumer *makes choices in such a way that his finances are in balance*,



*both in short and long term* ([van der Schors & Warnaar, 2013](#)). This can be achieved by having the following competences:

- Mapping, obtaining a complete overview of the personal financial situation.
- Responsible spending.
- Looking ahead to protect against risks.
- Consciously deciding on financial products.
- Obtaining sufficient financial knowledge.

To maintain this financial self-reliance in the long term. The consumer is expected to:

- Set goals.
- Maintain an organized financial administration.
- Create an overview of his future financial situation.
- Obtain insights from that overview.
- Make choices to reach his goals, based on his current situation.

Finally, we found that rational decision-making, an understanding of (economic) relations and interactions, and the economic system itself, should be included in financial education. Financial education, when applied correctly, should contribute to financial self-reliance and responsibility.

We conclude that consumers should balance income and expense in the short and long term. That combined with knowledge of the personal financial situation, the economic system and its financial products, should lead to a responsibly handled financial situation.

### **KQ-3: How can we help and activate consumers to responsibly handle their personal finances?**

Chapter 4 discussed various methods to help and activate consumers to handle their finances responsibly. A combination of methods, characteristics and techniques can be used to activate consumers and stimulate financial responsibility (or self-reliance):

- Nudging, gently encouraging people to make choices that are likely to benefit the chooser and the society ([Kroncke, 2018](#)).
- Financial literacy and education.
- Obtaining knowledge of personal situation.
- Setting SMART-goals.
- Planning.
- Considering future perspective.
- Monitoring and feedback.

- Binding techniques.
- Increasing self-efficacy.
- Timing of the solution.
- Social comparison.
- Partitioning resources.
- (Professional) financial advice.

A combination of these characteristics should lead to an improvement in the financial situation and the responsibility that the consumer takes in his financial life.

#### **DP-4: How can we design a solution which activates consumers to responsibly handle their personal finances?**

We designed an online platform that provides users with insights and actions that they can take to improve their financial situation. This should activate users to handle their finances in a responsible way. Chapter 6 described this platform and the design choices made.

#### **KQ-5: What effect does the proposed solution have on the way consumers handle their personal finances?**

We answered this questions in two parts. The first part is whether the consumer will use the Personal Finance Platform. And the second is whether the usage of the Personal Finance Platform has an effect on their financial situation.

- Will consumers use this solution?  
We took an online survey under 71 participants. The results of this survey indicate that participants find the answers provided by the solution interesting. The results of the UX-test (see Section 7.3) indicate that some users will use this application, but it depends on the trustworthiness of the platform and the technologies used. So, we conclude that, given that those conditions are met, consumers will use this application.
- Does the usage of this solution affect their financial situation?  
We measured whether the user processes the information, understands which results were urgent, and indicated that they would have acted immediately to solve those problems (see Section 7.3). So we can conclude that in the short-term the solution affects the way the user thinks about and handles his financial situation. However we were not able to measure whether this solution has a long term effect on the financial health. So the question has only partly been answers.

## **8.2 Main conclusion**

The main conclusion is that the proposed design Personal Finance Platform could be a solution that helps consumers with the personal finances and encourages financial responsibility. Through theoretical research we found characteristics to stimulate financial responsibility, and we applied those characteristics in the design of the Personal Finance Platform.

The Personal Finance Platform is a web based solution that provides, given the information from various data sources, the user with an overview of his financial situation. In this overview the user can see (potential) problems and opportunities, and is directly assisted into acting on them.

Using the design we created a MVP prototype, which we used to verify and conduct a UX-test for the solution. The test yielded promising results, several users indicated that they are likely to use this solution. But only if the platform and techniques are trusted by the users. This means that the platform has to be offered in a trusted environment (e.g. the website of their bank), which make the user more likely to provide his personal financial data.

# Chapter 9

## Discussion

In this chapter we discuss the methods and results of this research project. This study yielded several results: the design of the Personal Finance Platform, the card-sorting survey and the UX-test of the Personal Finance Platform. We will discuss the impact and limitations of each method and result in this chapter.

### 9.1 The Personal Finance Platform

The main result of our research is the design of the Personal Finance Platform. This web based solution provides users with a full overview of their financial situation. Though most themes of the personal financial situations are covered, our implementation misses the personal insurance policies. We could not find any data source that provided us with the information needed to make recommendations on insurance products. Also the data coverage on loans and debts is incomplete, because not all debts can be obtained from the Okto-data.

One of the main features that the Personal Finance Platform should offer, is feedback on the progress in the user's situation. In order to achieve that, we need continuous (or in any case regular) data updates from the data-sources that we use. Currently, Okto does not support that and PSD2 only offers 90 days of access to the data. So with every update, the user has to re-authorize the application to receive the data. This devalues the continuous feedback feature of our application, and this is something that we need to solve if the application is going to be developed further.

Most information provided by Okto is based on yearly (or in some cases monthly) updated data from the government, so data such as pension and income information can be outdated for up to a year. Nevertheless, this information is still very useful in a broad overview of the financial situation, but unfortunately not accurate on a day-to-day basis.

During the verification process of the personal finance platform, participants expressed concerns and issues related to data security and privacy. The Dutch General Data Protection Regulation (GDPR)<sup>1</sup> legislation has set guidelines for handling personal data. These guidelines include demands set on transparency, consent, automated profiling and decision-making, reporting of data breaches and data protection. During this research we did not investigate or design with this legislation in mind as this was out of scope for this project.

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<sup>1</sup><https://autoriteitpersoonsgegevens.nl/nl/zelf-doen/avg-guidelines>

However, a fully implemented solution should comply with this legislation.

Our research describes how to implement each feature of the Personal Finance Platform. We ensured that, with minimal user input, all necessary information is available to provide the desired information to the user. This report contains enough information to estimate the effort and complexity of each feature of the platform. This can, combined with the results of the survey, be used to create a plan for future development of this application. Preferably by implementing the most popular and effective features first.

Finally, the design and features are focused on activating the user to become financially responsible. Combined with what we learned about the current financial situation of the Dutch consumer, and how financially self-reliant consumers should behave, we know that this product should, when fully implemented, help consumers get a grip on their financial situation and make them self-reliant. It creates an overview of the financial situation, stimulates responsible spending and saving, warns for potential risks and helps decide on financial products. Also, it aids users in obtaining necessary financial knowledge.

## 9.2 Card sorting survey

The validation using the card sorting survey yielded promising results. The card sorting survey was filled in by 71 participants and found that there were multiple subjects in which the participants were interested. The participants were asked to place cards, with questions on them, in categories ranging from not interesting to very interesting, or indicate that they already know the answer. The idea behind this was to find out which questions about their personal financial situation the participants would like to have answered. The amount of cards sorted as *I already know this* was (unexpectedly) low. That might be because the participant actually does not know the answer, however it could also be caused by the fact that the participant is unsure of the correctness of his knowledge or interested in what information the answer could contain. In both cases, the Personal Finance Platform will be able to help the consumer in answering the question.

Though we tried to achieve a large number of participants for the survey, the sample size is still small in comparison to the entire population (the Dutch consumers). So we have to be careful about what we can conclude based on the results of the survey. We used the Monli page to distribute our survey, which creates the risk of only reaching consumers that are interested in finance. The promotional text (see Figure 7.2) could also bias the participant sample in a similar way, as it mentions finance. This sample bias has to be taken into account when interpreting the results of the survey.

During the analysis we noticed some weird answers. One participant categorized every card as *I already know this*, which is highly unlikely. This might be motivated by the possibility to win the gift card. If more participants acted in a similar way (e.g. giving fake answers) this might have influenced the results and the interpretation of the results.

The results of this survey can not only be useful for further development of the Personal Finance Platform, but also for other consumer oriented software that Topicus might develop in the future. Insight in what parts of their financial situation consumers find interesting, uninteresting or already know, can be used in any product that involves personal finance.

## 9.3 UX-testing the prototype

The second validation technique used was an UX-test on the MVP prototype with two goals. The first one was finding out whether people would actually use this product, and all its features. The second one was to determine whether the solution actually had an effect on the users.

The first goal was achieved. A part of the participants in the test indicated that they would probably use the solution. We have to note that the person who conducted the UX-test, was also the researcher that developed the solution as a graduation research. This might have influenced the participants as they were aware of that, and that might made them hesitant to make harsh comments. Nevertheless the results of the test could be a good indication of what would happen in real-life.

Additionally, several participants complained about the text and flow through the application. The quality of the user-flow was not what we were testing for, but that could have affected the users opinion about the application. If an application is illogical and irritating to use, the participant could be less positive about the features and insights it offers.

The second goal was to find out whether the solution actually improved the financial situation of the user. Given the limited time of this graduation research project, we did not have the means to actually measure the financial situation of the test subjects over time. An elaborate study into the development of the financial situation of users over time is needed to find out if the solution has an effect in the long-term. So alternatively, we measured whether the information provided by Personal Finance Platform was understood by the participants. Fortunately, that was the case for all the participants of the test. So based on that we can say that the information reaches the users of the application.

Additionally, we encountered some issues and suggestions for the prototype found by the participants. These suggestions are summarized in Section 7.3. These suggestions might not only be useful for the Personal Financing Platform, but could also be applicable to other applications developed by Topicus.

# Chapter 10

## Recommendations

### 10.1 Recommendations for Topicus

For Topicus the main goal of this research was to design a viable application that helps users in improving their financial situation. We have not been able to fully conclude that the application indeed helps users to improve their financial situation. However, we have determined that there is a need for the features the application offers, and that at least a part of the participants in the UX-test found the results useful and would be willing to use the application. The test also indicated that privacy and trust are significant factors in the choice of whether the user wants to use the application. If Topicus wants to develop this product further, we advise them to look at the recommendations that follow from the UX-test in Section 7.3. We are convinced that Topicus can clearly judge the viability of this product when acting upon those recommendations and the recommendations in this section, and thereby (perhaps) convince a customer to buy this product.

#### **Business case**

The business case for this product was out of scope for this research. However, we would advise to look into the financial viability of this product. There are various options to create business out of this solution, but whether that will offset the development costs is questionable. Our advice would be to find a partner in the development, or buy the application either as a service or in total. For banks this could be a way to improve their customer service, or for existing customers (such as Vereniging Eigen Huis) this could expand their portfolio (next to Kan ik blijven wonen?). The added value of the Personal Finance Platform for Topicus (or a customer of Topicus) is positive financial impact that this application might have on its users.

#### **Find a trusted partner**

If Topicus decides to develop this product in the current form, we would not advise them to bring it to the market under their own label. As the UX-tests show, there needs to be trust before an user wants to transfer his personal data to an online application. Even with clearly stating how the data is handled, stored and used, there will still be doubts about the trustworthiness of the application. We advise to partner up with a partner that already has the trust of the intended users, such as a bank, non-profit organization (for example Vereniging Eigen Huis or Nibud) or the government.

Another suggestion is to change the use case from providing insight for the user, to providing insight to a third party such as a debt counselor. This provides the user with a trusted partner to supply the information to (the debt counselor).

## **Convince users to provide data**

Even with a trusted partner, the user might be concerned to provide personal data. Topicus should look at the nudging techniques and test various methods of convincing the user to provide the data to the application. One could think of slowly building up trust, first providing some insights without linking data and convincing the user of the added value of this application. We recommend to brainstorm on several UX-designs that enhance this, and test them each on a test group. Additionally, the use of Ockto was by several participants observed as weird and inconvenient (see Chapter 9), so it would be wise to start a dialog with Ockto in order to simplify the usage of the app (see also the Future development section below).

## **Measuring and testing**

We already stated in Chapter 9, that we cannot fully conclude whether this application is improving the way consumers handle their finances. In order for Topicus to convince a partner to develop this application with them, they need to be convinced of the effect that this application has on the Dutch consumer. So more testing, either via user testing or a pilot program, can improve the possibility of selling this application to a customer of Topicus. A pilot program could be in the form of an fully implemented version of the MVP and UX-testing it with more subjects, which would enable a quantitative approach to the question.

## **Compliance to legislation**

The developed application uses a lot of personal data, and advises people based on this data. Financial advice and the collection of personal data are subject to legislation. Though the legal part was out of scope of this graduation project, it would be wise to develop an understanding of whether the workings of the proposed application are in compliance with legislation.

The GDPR legislation sets hard demands on how businesses should handle personal data. Every action such as collecting, storing, structuring, changing or using personal data is subjected to the GDPR guidelines. Whether the Personal Finance Platform complies with this legislation, and what possible alterations have to be done in order to comply should be further investigated before developing the solution.

The Dutch law describes financial advice as *a business recommends a specific financial product, from a certain service provider to a certain customer* (AFM, 2019). Financial advice is regulated, as it requires a permit. However, following that definition, the Personal Finance Platform is not providing financial advice at this moment. But, this might become something to keep in mind when further developing this platform. Also, we recommend to further research or consult with legal experts to find out if all the statements and suggestions in this application are on par with current Dutch consumer legislation.



## Future development

After the initial development of the application as specified in this report. There are several suggestions for further development and improvement.

### Insurance coverage

The goal of this application is to offer a full view of the users financial situation, preferably using external data sources. During the process we did not find a way to measure insurance coverage and double insurance policies, so one part of the user's financial situation remains uncovered. Currently, there is no data source that provides the needed insurance data, and asking users is very complicated and intrusive. We suggest to investigate further into techniques that are able to analyze insurance policies and provide a way to show gaps and redundancies in insurance products of the user.

### Ockto

When using Ockto, the user is required to use a mobile phone app. From the UX-test we know that this is experienced as inconvenient. We would recommend finding another way to obtain the data that Ockto provides. Either by changing how Ockto works, or by finding another partner that can deliver the required data. In another application developed by Topicus, users had the possibility to choose whether they would want to use Ockto or provide (a lot of) data themselves. Data from that application indicates that about 30% of the users chose to use Ockto. In order to make Ockto a useful source of data for the Personal Finance Platform, we need a higher percentage of users that use Ockto.

## 10.2 Recommendations for further research

As stated earlier in Chapter 8, the measurement of the effectiveness of the proposed solution was quite complicated and not fully completed. So whether the application does have a positive effect on the user's financial situation remains to be answered. We view that the best way to measure that is to see the effect of the usage of this application over time. But to measure that, the application has to be implemented (or at least a working prototype), which is out of the (time) scope for this research. We recommend to investigate possible ways to measure the effectiveness of this solution further.

In general we have seen reports and evidence of the effect financial educations programs (Yoong et al., 2013) on financial well being. But the effect of IT solutions on the financial self-reliance and well being of consumers, remains an interesting subject for research. There are enormous possibilities with modern, data-driven, software applications that can help simplifying complex financial problems in a convenient and user friendly way. The benefit, possibilities and consequences of those new technologies should be researched to determine their effect on the financial situation of consumers.

# Appendices

# Appendix A

## Personas

## Marianne



Motivaction	Postmaterialist
Day activity	ZZP
Occupation	Freelance Journalist
Housing	Own house
Place of living	Haarlem
Age	35
Income	Middle – 2500
Education	HBO – Journalism
Relationship status	Alone
Children	No

### Personal preferences

Transport	Volvo 240, public transport
Political party	Groen Links
Free time	Reading, walks
Holidays	City trip with friends

### Financial products

Mortgage	Yes, with repayment
Savings	Low, 1500
Pension	Government only
Study debt	Low, already repaid

### Motivaction characteristics

- Self-development
- Solidarity, tolerance and social
- Attention to immaterial values
- Art and culture
- Sober
- Not focused on consumption and entertainment
- Work life balance
- Political and social engagement

### Financial challenges

- Pension, decrease in income after retirement
- Saving for unexpected expenses

## Diederick



Motivaction	Upward mobile
Day activity	Salaried employment, contract for a year
Occupation	Deloitte – Medior Consultant
Housing	Rental apartment
Place of living	Amsterdam
Age	30
Income	High - 3250
Education	WO – Economics
Relationship status	Alone
Children	No

### Personal preferences

Transport	Lease Golf GTE
Political party	VVD
Free time	Festivals, parties
Holidays	Skiing, long trips with airplane

### Financial products

Mortgage	No
Savings	None
Pension	Employer
Study debt	45 000

### Motivaction characteristics

- Career focused
- Social status
- Being free
- Open for change and progression
- Work is the main motivator, which drives identity and status
- Main goal is increasing income
- Materialistic and sensitive to status
- Technology minded
- Impulsive and adventurous
- Individualistic

### Financial challenges

- Saving for unexpected expenses
- Buying a house
- Repaying student loan
- Find a more durable way to spend income

## Jeroen



Motivaction	Modern bourgeoisie
Day activity	Salaried employment
Occupation	Managing director of a small consultancy agency
Housing	Own house
Place of living	Vleuten
Age	40
Income	Very High – 8000
Education	HBO – Business administration
Relationship status	Married, wife works part-time
Children	3, all playing field hockey

### Personal preferences

Transport	Lease BMW 5-serie
Political party	VVD
Free time	Reading, walking, children
Holidays	Skiing, bed and breakfast abroad

### Financial products

Mortgage	Yes, interest only, 50% repaid
Savings	More than enough, 35000
Investment funds	65000
Pension	Yes, but not nearly enough
Study loan	Yes, but repaid in total
Debts	Sometimes overdrawn on payment account

### Motivaction characteristics

- Balance between traditional society and change
- Family central
- Building status and prestige
- Risk averse and conformist
- Certainty
- Consumption and entertainment
- Materialistic and status oriented

### Financial challenges

- Income after retirement
- A lot of savings, can be invested

Jan

Motivaction	Traditional bourgeoisie
Day activity	Salaried employment, permanent contract
Occupation	Administrative job for KPN
Housing	Own house
Place of living	The Hague
Age	35
Income	High – 3500
Education	HBO
Relationship status	Living with his girlfriend
Children	One, goes to primary school



#### Personal preferences

Transport	Bike and Mazda 6
Political party	CDA
Free time	Cycling
Holidays	Camping in France

#### Financial products

Mortgage	Yes, interest only, high monthly costs
Savings	Average, 10000
Investment funds	Nee
Pension	Yes, employer
Study loan	No
Debts	No

#### Motivaction characteristics

- Moralistic and dutiful
- Conservation of traditional norms and values
- Peaceful and harmonious life
- Involved and solidary
- National oriented
- Risk averse
- Economical and sober

#### Financial challenges

- Income after retirement
- Interest only mortgage may cause problems

## Harry

Motivaction	Convenience oriented
Day activity	Salaried employment, permanent contract
Occupation	NS – Railway guard
Housing	Rental home
Place of living	Village near Utrecht
Age	45
Income	Middle – 2150
Education	MAVO
Relationship status	Married (wife has an incapacity to work)
Children	None



### Personal preferences

Transport	Bicycle and public transport
Political party	PVV
Free time	Watching soccer
Holidays	Camping

### Financial products

Mortgage	No
Savings	Low, 500
Investment funds	No
Pension	Yes, employer
Study loan	No
Debts	Often overdrawn

### Motivaction characteristics

- Material wealth
- Easy and comfortable living
- Entertainment
- Low ambition
- Desire to be valued and recognized
- Materialistic and focused on consumption
- Individualistic

### Financial challenges

- Saving to cover unexpected expenses
- High financial risk caused by low savings and income



# Appendix B

## Vision board

## Audience

- Diederick
- Plays Squash
- 29 years old
- Lease and subscriptions
- Single
- Lives in Amsterdam
- Has expensive stuff and high monthly expenses
- Rents his home

## Pains

- Cannot buy a house
- Risk of unemployment
- No more holiday with friends
- No more gadgets
- Losing subscriptions
- No insight in financial situation
- Debt

## Gains

- Has a lot of friends, some from his fraternity
- Uses "Thuisbezorgd" to deliver stuff and food at home
- Salary is above average
- Nonchalant
- Lots of expensive holidays, with airplane
- Enjoys life
- Goes to festivals

## Product

- Confronting with possible job loss
  - Showing scenario's
  - Success stories
  - LinkedIn, Whatsapp, Media websites, Youtube, Geenstijl
  - Campaign at festival
  - Banks
  - Financial advisor
  - Network meetings
  - Ready solution within one click
  - Showing where he could live
  - Gamification of saving behavior
  - Five question financial checkup
  - Festival goodie
  - Guerilla stunt with money on street
- Premium club
  - Interest points
  - Tikkie
  - Saving together for holidays
  - You saved 100 euro's, good job!
  - Creating curiosity ("We are going to call you with a special offer")
  - Rewards
  - Group game, game of life with financial goals
  - Sharing result on social media
  - How often do you put money aside?
  - Lottery, more saving, more tickets, more chance of winning
  - Poor for a day escape room
  - Postcard
  - Phone financial checkup

# Appendix C

## Screen designs

## Welkom bij het Personal Finance Platform van Monli



### Binnen 5 minuten grip op je financiële situatie

Met deze tool kunnen wij jou op een eenvoudige en makkelijke manier direct inzicht geven in jou financiële situatie. Zo zie je meteen of je wel voldoende spaart, je pensioen op orde is en of je niet te veel betaald voor je verzekeringen en diensten. Door te koppelen met je bank en persoonlijke gegevens, kunnen we je binnen 5 minuten duidelijkheid geven.



### Blijf op de hoogte

Doordat we op een slimme manier koppelen met jouw gegevens, kunnen we je continu op de hoogte houden. Uiteraard zullen we je niet te vaak lastig vallen. Maar als wij eventueel problemen of kansen bespeuren, zullen we je dat meteen laten weten. Natuurlijk kan je er ook voor kiezen, om het rustig op je eigen moment te bekijken.



### Klaar voor de toekomst

Niet alleen je huidige financiën worden door ons bekeken. Ook kijken we hoe je situatie er in de toekomst uit ziet. Wil je na je pensioen in dit huis blijven wonen? Of ga je liever eerder te stoppen met werken? We kunnen je meteen laten zien wat je hiervoor moet doen. Of misschien is dat nu al wel mogelijk!

Ja, ik wil grip op mijn financiële situatie



STAP 1 van 2

## Laten we beginnen! Eerst koppelen we jouw bankgegevens



### Direct inzicht in vermogen, inkomsten en uitgaven

Door te verbinden met jouw bankrekening kunnen we direct zien hoe je huidige situatie er voor staat. We controleren of je inkomsten en uitgaven in balans zijn en je wel voldoende spaargeld hebt om eventuele problemen op te vangen. Maar we kijken ook of je niet nog iets kunt besparen op je zorgverzekering. Daarnaast vergelijken we je energiecontract met andere aanbieders om te kijken of jij wel de beste deal hebt.

Het koppelen van je bankrekening gaat via iDiN. Hierna zal je bank je transactiegegevens met ons delen. Onze systemen maken vervolgens regelmatig een analyse op je betalingen. Hierdoor blijf je altijd op de hoogte van je financiële situatie en kunnen we je waarschuwen als er iets mis dreigt te gaan.

Als je, op dit moment, toch niet wil koppelen met je bank is dat uiteraard geen probleem. Helaas zullen we dan wat minder informatie over jou ontvangen, en kunnen wij je minder goed informeren over je financiën. Als je later toch besluit om te koppelen, is dat uiteraard mogelijk.

Sla deze stap over

Koppelen via IDIN



STAP 1 van 2

## Eerst koppelen we jouw bankgegevens



Kies je bank om in te loggen met iDIN

GOED 1 SNSLABEL

Sla deze stap over

Volgende stap



STAP 2 van 2

## En koppelen we jouw overheidsgegevens



Graag zouden we de informatie die bekend is bij de overheid van jou ontvangen. We gebruiken hiervoor Ockto. Ockto is een app die de mogelijkheid biedt om eenvoudig en snel alle voor ons relevante informatie van jou naar ons op te sturen. Hierdoor kunnen we snel een volledig beeld van jouw situatie vormen.

Sla deze stap over

Koppelen met Ockto



## En koppelen we jouw overheidsgegevens

### Hoe werkt Ockto?

Graag zouden we de informatie die bekend is bij de overheid van jou ontvangen. We gebruiken hiervoor Ockto. Ockto is een app die de mogelijkheid biedt om eenvoudig en snel alle voor ons relevante informatie van jou naar ons op te sturen. Hierdoor kunnen we snel een volledig beeld van jouw situatie vormen.



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- 3 Controleer je gegevens
- 4 Vestuur ze naar je bank

## Download de Ockto app

Scan de QR-code of klik op onderstaande buttons vanaf je mobiel of tablet.



## Scan de QR-code

- 1 Open de Ockto app
- 2 Scan de QR-code
- 3 Volg de instructies op je telefoon

Sla deze stap over

Naar mijn overzicht



## Deel je banktransities

Door te koppelen met je bank kunnen wij veel nuttige tips en aanbevelingen geven. Het kost maar een paar minuutjes om nog meer inzicht te krijgen in je situatie.

Ja, ik wil mijn transacties delen

## Jouw financiële situatie



### Op dit moment ziet het er allemaal goed uit

Het meeste heb je op orde en je doet het beter dan **69 procent van de mensen** in een vergelijkbare situatie. Wel is ons opgevallen dat je nog wat toeslagen kan aanvragen en opzeggen. Hier kan je misschien zo even naar kijken.

## Toeslagen

Er zijn toeslagen waarvoor je in aanmerking komt. En je blijkt toeslagen te ontvangen waar je geen recht op hebt.

- Je ontvangt nog zorgtoeslag! Hier heb je helaas geen recht meer op. Zeg je zorgtoeslag dus zo snel mogelijk op! Hiermee voorkom je dat je straks tot **1140 euro** moet terugbetalen. Dit aanpassen kan je hier eenvoudig doen.
- Je hebt recht op kinderbijslag! Dit aanvragen levert je zo'n **67 euro** per maand op. Bij de belastingdienst kan je dat in een paar minuten voor jezelf regelen.

## Inkomsten & uitgaven

Je hebt je inkomsten en uitgaven in balans, maar houdt niets over. Probeer je uitgaven wat te beperken, om wat te kunnen sparen. Aanbevolen voor jou is om minstens **350 euro** per maand apart te zetten!

- Je geeft erg veel uit aan je internetabonnement. Kijk op [Pricewise](#) om een betere deal te vinden. Hiermee bespaar je al snel **20 euro** per maand!

## Pensioen

We zien dat je al aardig wat pensioen aan het opbouwen bent. Helaas lijkt het erop dat dit uiteindelijk onvoldoende gaat zijn om straks je huidige levensstandaard te behouden. We adviseren je om nog wat meer op te bouwen dan je nu al doet. Op dit moment is het dus ook niet mogelijk om eerder te stoppen met werken. Mocht je dat wel van plan zijn, dan moet je daar nu al rekening mee houden.

- Naast je collectieve pensioen en AOW, kan je ook zelf een extra pensioenproduct aanschaffen. We hebben er even naar gekeken en hebben hier een overzicht klaar staan van opties die goed bij jouw situatie passen.

## Schulden

- Bij ons zijn er geen schulden van je bekend. Wel heb je natuurlijk je creditcard, maar daar ga je zeer verstandig mee om. Ga zo door!

## Hypotheek

- Je hypotheek is op orde. Zowel nu als in de toekomst kan jij je maandlasten zeker dragen. Je rente is niet te hoog en je lost voldoende af. Ga zo door!

## jouw financiële situatie



### Op dit moment ziet het er allemaal goed uit

Het meeste heb je op orde en je doet het beter dan **69 procent van de mensen** in een vergelijkbare situatie. Wel is ons opgevallen dat je nog wat toeslagen kan aanvragen en opzeggen. Hier kan je misschien zo even naar kijken.

## Toeslagen

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# Appendix D

## Prototype

## Welkom bij het Personal Finance Platform van Monli



### Binnen 5 minuten grip op je financiële situatie

Met deze tool kunnen wij jou op een eenvoudige en makkelijke manier direct inzicht geven in jou financiële situatie. Zo zie je meteen of je wel voldoende spaart, je pensioen op orde is en of je niet te veel betaald voor je verzekeringen.



### Blijf op de hoogte

Doordat we op een slimme manier koppelen met jouw gegevens, kunnen we je continu op de hoogte houden. Maar als wij eventueel problemen of kansen bespeuren, zullen we je dat meteen laten weten.



### Klaar voor de toekomst

Niet alleen je huidige financiën worden door ons bekeken. Ook kijken we hoe je situatie er in de toekomst uit ziet. Wil je na je pensioen in dit huis blijven wonen? Of ga je liever eerder te stoppen met werken?

Ja, ik wil grip op mijn financiële situatie



STAP 1 van 7

## Laten we beginnen! Eerst koppelen we jouw bankgegevens



### Direct inzicht in vermogen, inkomsten en uitgaven

Door te verbinden met jouw bankrekening kunnen we direct zien hoe je huidige situatie er voor staat. We controleren of je inkomsten en uitgaven in balans zijn en je wel voldoende spaargeld hebt om eventuele problemen op te vangen.

Het koppelen van je bankrekening gaat via iDIN. Hierna zal je bank je transactiegegevens met ons delen.

Als je, op dit moment, toch niet wil koppelen met je bank is dat uiteraard geen probleem. Helaas zullen we dan wat minder informatie over jou ontvangen, en kunnen wij je minder goed informeren over je financiën.

Sla deze stap over

Koppelen via IDIN



STAP 2 van 7

## Eerst koppelen we jouw bankgegevens



Kies je bank om in te loggen met IDIN

Rabobank

Sla deze stap nu over

Volgende stap



STAP 3 van 7

## Inloggen



NL | EN

### Bankpas

Rekeningnummer

NL44 RABO 0123 4567 89

Pasnummer

0123

☐ Onthouden

- Bankpas in de Rabo Scanner plaatsen
- Pincode invoeren
- Scan de kleurcode
- Controleer de samenvatting op de Rabo Scanner

Inlogcode

|

Inloggen

Ziet u iets ongewoons? Stop en bel 0900 0905 (gebruikelijke belkosten).  
Belt u uit het buitenland? Bel dan +31 887 226 627



Rabo Scanner

STAP 4 van 7

## Jouw pensioen

€ Om jullie pensioen goed te begrijpen hebben we een vraag voor je:

Hoeveel jaar heb je in het buitenland gewerkt?

En je partner?

Sla deze stap over

Volgende stap



STAP 5 van 7

## Toeslagen

€ Om jullie toeslagen te checken, hebben we wat meer informatie nodig:

Studeer je? ☐ Ja ☒ Nee

En jouw partner? ☐ Ja ☒ Nee

Over jullie kind, Joris, hebben we ook nog wat vragen

Gaat Joris naar een opvang? ☒ Ja, buitenschoolse opvang ☐ Ja, dagopvang ☐ Nee

Is dat bij een gastouder of kinderopvang? ☒ Kinderopvang ☐ Gastouder

Hoeveel uur gaat hij naar de opvang?

Hoeveel kost de kinderopvang per uur?

Sla deze stap over

Volgende stap

STAP 6 van 7

## Koppelen met overheidsgegevens

### Alle overheidsgegevens bij elkaar

Graag zouden we de informatie die bekend is bij de overheid van jou ontvangen. We gebruiken hiervoor Ockto. Ockto is een app die de mogelijkheid biedt om eenvoudig en snel alle voor ons relevante informatie van jou naar ons op te sturen. Hierdoor kunnen we snel een volledig beeld van jouw situatie vormen.

Sla deze stap over

Volgende stap

## En koppelen we jouw overheidsgegevens

### Hoe werkt Ockto?

Graag zouden we de informatie die bekend is bij de overheid van jou ontvangen. We gebruiken hiervoor Ockto. Ockto is een app die de mogelijkheid biedt om eenvoudig en snel alle voor ons relevante informatie van jou naar ons op te sturen. Hierdoor kunnen we snel een volledig beeld van jouw situatie vormen.



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- 3 Volg de instructies op je telefoon



Sla deze stap over

Naar mijn overzicht

## Jouw financiële situatie



Op dit moment ziet het er allemaal goed uit, je doet het **beter dan 56 procent** van de mensen in een vergelijkbare situatie. Wel is ons opgevallen dat je nog wat **toeslagen kan aanvragen en opzeggen**. Hier kan je misschien zo even naar kijken.

## Toeslagen

Er zijn toeslagen waarvoor je in aanmerking komt. En je blijkt toeslagen te ontvangen waar je geen recht op hebt.

- Je ontvangt nog zorgtoeslag! Hier heb je helaas geen recht meer op. Zeg je zorgtoeslag dus zo snel mogelijk op! Hiermee voorkom je dat je straks tot **€ 1140,-** moet terugbetalen. Dit aanpassen kan je [hier](#) eenvoudig doen.
- Jullie hebben recht op kinderopvangtoeslag! Dit aanvragen levert je zo'n **€ 159,-** per maand op. Bij de belastingdienst kan je dat in een paar minuten voor jezelf regelen.

## Spaargeld en vermogen

We zien dat je een tekort aan spaargeld hebt. Het is verstandig om minimaal **€ 3863,-** op spaarrekening te hebben staan om onverwachte uitgaven op te vangen. Op dit moment heb je slechts **€ 3212,- gespaard**.

- We adviseren je **€ 60,-** per maand apart te zetten. Zo heb je binnen een jaar je buffer weer op niveau.

## Pensioen

Van 1 oktober 2055 zal jij AOW pensioen ontvangen en jouw partner op 1 november 2056. Dat is nog lang weg, maar daarvoor ben je nu al aan het sparen. Jullie zullen beiden maandelijks **€ 814,-** AOW pensioen ontvangen en gezamenlijk maandelijks **€ 984,-** collectief pensioen

- Op dit moment zijn jullie goed bezig met het opbouwen van jullie pensioen. Als jullie zo door gaan, dan zullen jullie **voldoende pensioen** opgebouwd hebben als jullie met pensioen gaan. Dit houdt in dat jullie waarschijnlijk **71%** van jullie laatste inkomen zullen ontvangen. Als je dit nog wilt verhogen, kan je [hier](#) nog extra regelingen treffen

## Appendix E

### Card sorting screenshot





Heb ik onverantwoordelijke schulden?

Kan ik besparen op mijn vaste kosten?

Wat moet ik doen om eerder met pensioen te gaan?

Welke risico's loop ik als de hypotheekrente stijgt?

Staat mijn huis onder water?

Heb ik recht op een toeslag die ik nu niet krijg?

Heb ik voldoende spaargeld om onverwachte problemen op te vangen?

Heb ik baat bij het extra aflossen op mijn hypotheek?

Zijn mijn inkomsten en uitgaven in balans?

+ + Het antwoord op deze vraag vind ik zeer interessant

## Kan ik in mijn huis blijven wonen na mijn pensioen?

Zijn er interessante investeringsmogelijkheden voor mijn spaargeld?

+ Het antwoord op deze vraag vind ik interessant

Gebruik een toeslag  
geen recht op heb?

- Het antwoord op deze vraag vind ik misschien interessant

Heb ik baat bij het versneld  
aflossen van mijn schulden?

Krijg ik later voldoende pensioen?

- - Het antwoord op deze vraag vind ik niet interessant

Het antwoord op deze vraag weet ik al

Heb ik baat bij het oversluiten van mijn hypotheek naar een lagere rente?

 Bekijk instructies

Laat een reactie achter

## Afronden

# Appendix F

## Survey results

Category ● 0 - Not interesting ● 1 - Already know this answer ● 2 - Maybe interesting ● 3 - Interesting ● 4 - Very interesting



# Appendix G

## UX-Test scenario

**Scenario:**

Op dit moment heb je het gevoel dat je geen grip hebt op je eigen financiële situatie. Daarom heb je op het internet gezocht naar iets wat jou daarmee kan helpen. In jouw zoektocht ben je op het Personal Finance Platform gestuit.

**Opdracht:**

Onderzoek of er problemen zijn in jouw financiële situatie.

**Jouw gegevens:**

Geboortedata:	01-04-1983
Geboortedata partner:	01-06-1987

Inkomen:	€ 36.000	bruto per jaar
Inkomen partner:	€ 24.000	bruto per jaar

Bankieren doen jullie bij de Rabobank

Zowel jij als je partner hebben niet in het buitenland gewerkt.

Jullie studeren beiden niet meer.

Jullie hebben één kind, Joris, dat naar de basisschool gaat. Hij gaat maandelijks 32 uur naar buitenschoolse opvang "De Spetters". Hiervoor betalen jullie € 8.50 per uur.

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