Project Portfolio: Gambless

FSWP4025H: Design of Digital Interventions
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Introduction

Gambling behavior occurs in different forms. It ranges from non-gambling, to occasional or recreational gambling, to at-risk gambling, to problem gambling (Floros, 2018). The term problem gambling is used interchangeably with many other terms, such as addiction gambling, gambling disorder, or pathological gambling. In the DSM-5-TR, criteria for gambling disorder are feeling irritable when trying to stop gambling, lying to friends and family about gambling behavior, and chasing losses (American Psychiatric Association, 2022). In 2011, an interview was conducted with 500 Dutch regular gamblers. It was concluded that 38% of the regular gamblers were risky gamblers (19%) or problem gamblers (19%) (Bieleman, 2011). This research defined problem gamblers as gamblers who scored 5 or higher on the South Oak Gambling Score (SOGS). This is a list of questions that feature some of the categories that the DSM-5 also uses, and more. Gainsbury et al. (2013) defined problem gambling as gambling with difficulties limiting the time and money spent. These are the dimensions of the problem that we will proceed with in the design of our intervention and the rest of this paper. People who gamble online are three to four times more likely to have a gambling problem compared to people who gamble offline (Wood & Williams, 2011). Since young adults are most at risk for problem gambling behaviors (Gainsbury et al., 2013; Hollén et al., 2020), our intervention aims to promote responsible online gambling amongst Dutch young adults. When designing our intervention, we made use of the framework proposed by Van Gemert-Pijnen et al. (2011), called the CeHRes Roadmap (Figure 1). This roadmap introduces 5 stages of designing interventions, of which we finished the first three stages: contextual inquiry, value specification, and design. In the following sections, we will describe each of these phases.

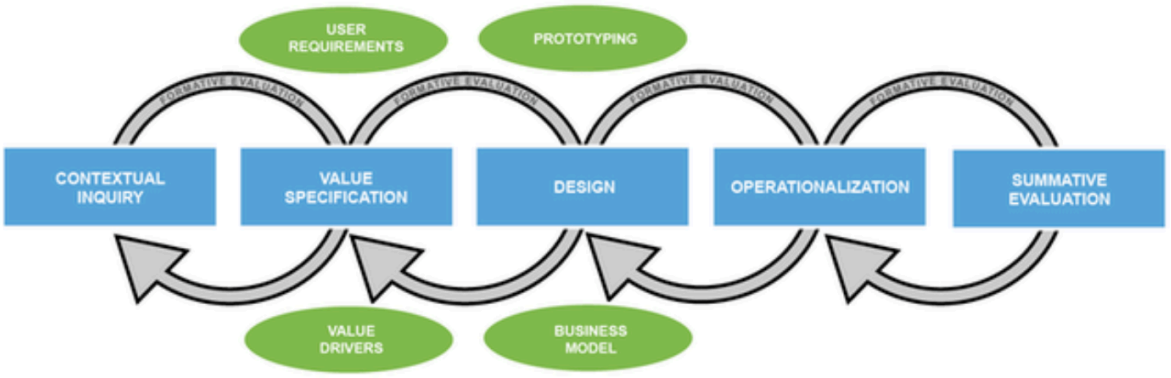

Figure 1. *The CeHReS Roadmap*

Contextual inquiry

The first phase that the CeHReS Roadmap proposes when designing a digital intervention is the contextual inquiry. In this phase, the context of the problem is investigated. All relevant stakeholders, their interests, the current state of the problem, and its weak and strong facets should be identified. It is also important to get a good idea of the users and their needs (Van Gemert-Pijnen et al., 2011). Several methods were used to get ahold of all this information,

such as literature- and desk research, and expert-, and user interviews. In the next paragraphs, we will walk you through the methods we used in the contextual inquiry.

Literature and desk research

We started by reviewing the current literature available on responsible online gambling. The performance of gambling behaviors was analyzed in detail, looking into what drives people to start gambling, what prompts them to keep gambling, and what factors predict irresponsible gambling behavior. From this research, we discovered that young adults are more at risk than other groups of developing gambling problems. That is because they may have cognitive immaturities which cause them to make poor judgements about statistical probabilities and their perceived control over their gambling outcomes, leading them to chase losses (Gainsbury et al., 2013, Hollén et al., 2020). Therefore, we chose this group as the target group of our intervention. Young adults are drawn to gambling by friends/social interactions and excitement of winning money, and also by incentives given by gambling sites, such as promotions and bonuses (Kim et al., 2017; Messerlian, 2004; Riley et al., 2021; Gainsbury et al., 2020). The factors that predict irresponsible gambling behaviors include gambling frequency; gambling intensity and urgency; gambling trajectory and regularity; gambling variability; customer support connect frequency; and game variety (Braverman & Shaffer, 2010; Haefeli et al., 2011; Mazar et al. 2020).

We also investigated past interventions aiming to prevent irresponsible gambling behavior. We found that many safety regulations and responsible gambling features (RGFs) are already available on most gambling sites. Three types of RGFs exist. The first type is player initiated RGFs, like limit setting or self exclusion. These RGFs focus on the player's own action to gamble more responsibly. The second type is aimed at promoting informed player's choice, that is providing information about risk of gambling, expenses, patterns, prize-back percentages, self diagnostics tool, et cetera. Lastly, some RGFs are focused on action from the gaming company, like banning players, imposing limits, or prohibiting site access and transaction. However, it was found that this category was the least effective and that the most effective types of RGFs were ones that encouraged player autonomy and empowered them to make rational decisions with sufficient information and means of control (Wood et al., 2014). This is in line with the self-determination theory, which suggests that feelings of autonomy and competence increase motivation to act (Ryan & Deci, 2000).

The literature research also yielded important information about barriers to responsible gambling. Themes that are often mentioned include a general lack of knowledge of safety regulations and RGFs on gambling sites, and a lack of perceived relevance for RGF use, as most gamblers thought these were only relevant to problem gamblers (Gainsbury et al., 2019). Additionally, many gamblers fail to recognize themselves as problem gamblers (Shah et al., 2019). It was also reported that gamblers usually did not trust online gambling sites, and they often experienced poor customer communication (Gainsbury et al., 2013). One of the most significant barriers that we identified was the lack of communication between different gambling providers (Drosatos et al., 2018). All sites have different safety regulations, RGFs, and criteria to detect irresponsible gambling. This lack of consensus makes it easy for users to bypass safety regulations. If they exceed their limits on one site they can easily change sites and keep gambling. This also makes it very hard for users to accurately track their gambling behaviors and their expenses, as the reports provided are specific to each site.

After these research findings we came together as a group to integrate our knowledge and create a first sketch of the main barriers and issues of responsible online gambling (Figure 2).

Figure 2. *Mind map*

However, after an informal discussion with an expert on gambling behaviors and digital interventions, it was clear that more research had to be conducted on the contextual factors that affect online gambling behavior. We realized that we mainly focused on gambler's behaviors, which led us to miss the importance of the broader context in which gambling takes place and of the various stakeholders involved. Thus, we iterated and conducted a second inquiry.

This second contextual inquiry included literature research, desk research, a trial of an online gambling experience, and user research. This inquiry yielded important findings. Firstly, it appears many rules and regulations already exist in the Netherlands and the Dutch Gambling Authority (KSA) is highly involved in fostering responsible gambling. Exploration of the KSA website revealed that all online gambling providers require a license, which is approved under strict inspection of compliance regulation (e.g. inclusion of RGFs). Costly fines are given to illegal websites. Additionally, a lot of information is provided to gamblers, for example about the risks of addiction to each gambling game, where to get help for addiction problems, how to prevent addiction, et cetera. All gamblers also need to identify themselves through their DigiD to be able to access both online and offline gambling providers. This is done so that gambling eligibility can be checked, as there is an option for problem gamblers to register on a list called the Centraal Register Uitsluiting Kansspelen (CRUKS) and get banned from all gambling providers for 6 months. While the CRUKS list is a greatly effective way to keep people from gambling, it has some limitations. First, players need to acknowledge their gambling problem in order to register themselves on the list, and second, players would still be able to gamble through illegal means. Thus, the presence of illegal online gambling websites was also established as a barrier to adherence to the national safety regulations and, consequently, to responsible gambling behavior.

The role of financial institutions in online gambling was also examined. It was found that besides enabling gambling transactions, they also have a direct interest in preventing customers from falling into financial difficulties, and preventing criminal activities, such as

fraud or money laundering (Swanton et al., 2019). Additionally, they lack transparency and communication with gambling providers. This is an obstacle in tracking gambling expenses, since gamble wins are often deposited as new gambling credit instead of sending money to the gamblers' bank account. This complicates accurate estimation about the monetary wins and losses in a game or over a period of time. The lack of communication in this respect is also likely due to the high ethical and legal concerns in sharing personal information that financial institutions need to deal with.

User research

The interviews with gamblers greatly contributed to our inquiry and provided us with significant insight into gambling behavior. However, it must be considered that only two subjects agreed to be interviewed and were both young adult males who gambled occasionally and recreationally. They were interviewed on various aspects of their gambling experiences, and their responses gave us some interesting insights. It was discovered that users gamble to "*earn easy money,*" which could indicate a distorted perception of gambling mechanisms and a lack of awareness of gambling expenses. They did not consider themselves irresponsible gamblers because they "*did not use money from their living expenses or emergency fund to gamble.*" Social influences have a large impact on gambling behavior, as they impact the beginning and perpetuation of gambling habits. Users lack trust in gambling providers; they express concerns about their privacy and the integrity of online gambling mechanisms. From our experience on the gambling websites, it became clear that safety regulations and RGFs are not very salient and could be easily missed by gamblers. Indeed, the users reported not being aware of, or knowing about any RGFs and safety regulations. When asking users about specific RGFs, most were deemed to be useless as they could be easily evaded. Tracking gambling expenses was the only RGF perceived to be useful and beneficial.

After this second inquiry, the findings were integrated on a problem map in which the barriers of responsible gambling were categorized and analyzed for each of the four main stakeholders (Figure 3).

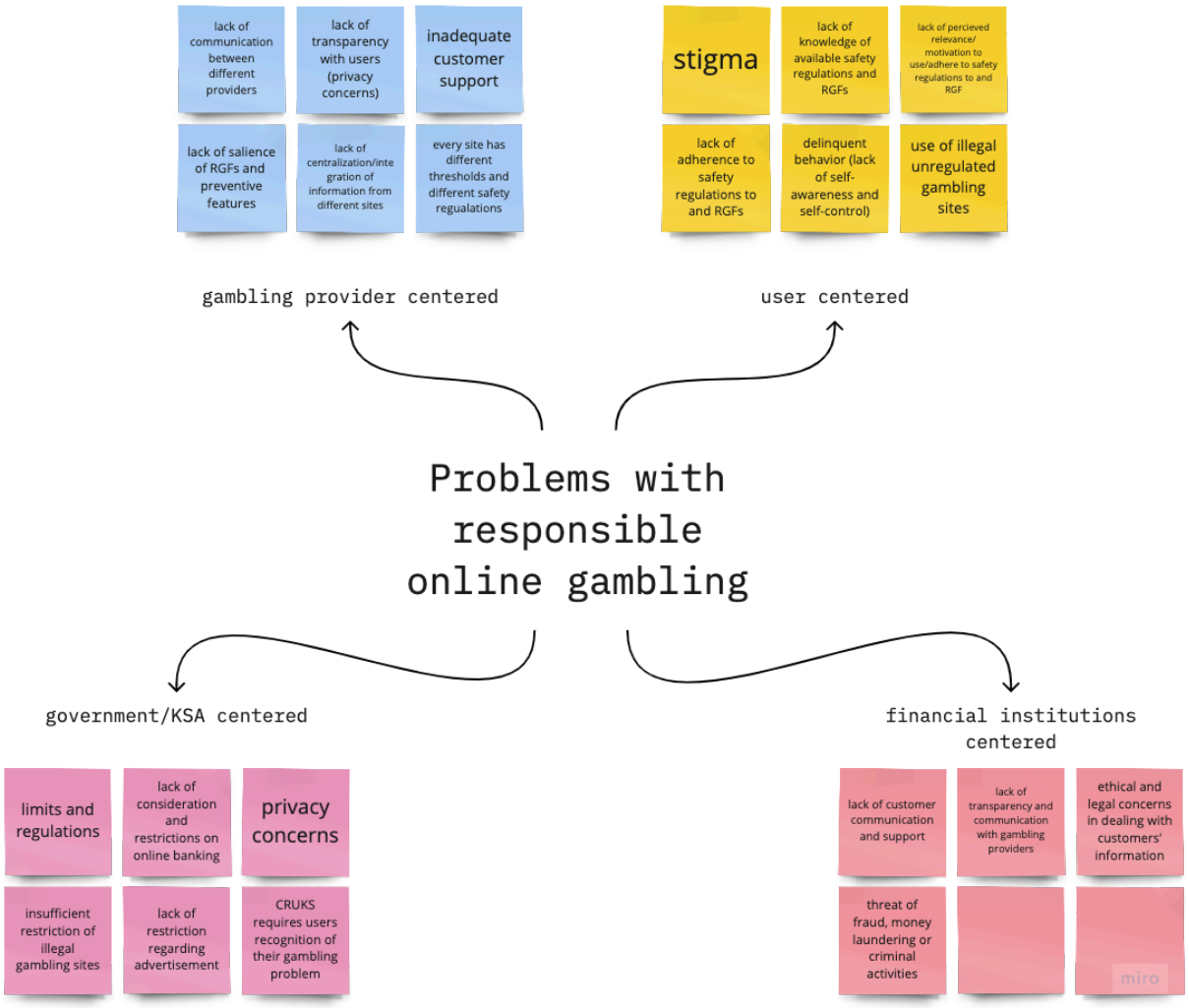

Figure 3. *Problem map*

Stakeholder map

Based on the findings of our inquiry, we identified the stakeholders of our intervention. Stakeholder salience was determined by their legitimacy, power, and urgency. We ended up with primary, secondary and tertiary stakeholders. The primary stakeholders of our intervention are the research and design team, and the target user of our intervention (i.e. Dutch young adults who gamble online). The online gambling providers were also identified as primary stakeholders as they enable gambling and store information about gamblers' behaviors and patterns. Lastly, banks or financial institutions are also primary stakeholders as they enable gambling transactions and store information about gambling expenses. Secondary stakeholders that were identified were the Dutch Gambling Authority (KSA) who devise gambling regulation, as well as gambling experts, and digital app designers, who will provide their expert opinion and guide our design process. Tertiary stakeholders included NGOs dedicated to helping problem gamblers, as well as users' social environment and social media, as these will influence users' gambling beliefs and behaviors. A visual representation of the stakeholder map can be found in Figure 4.

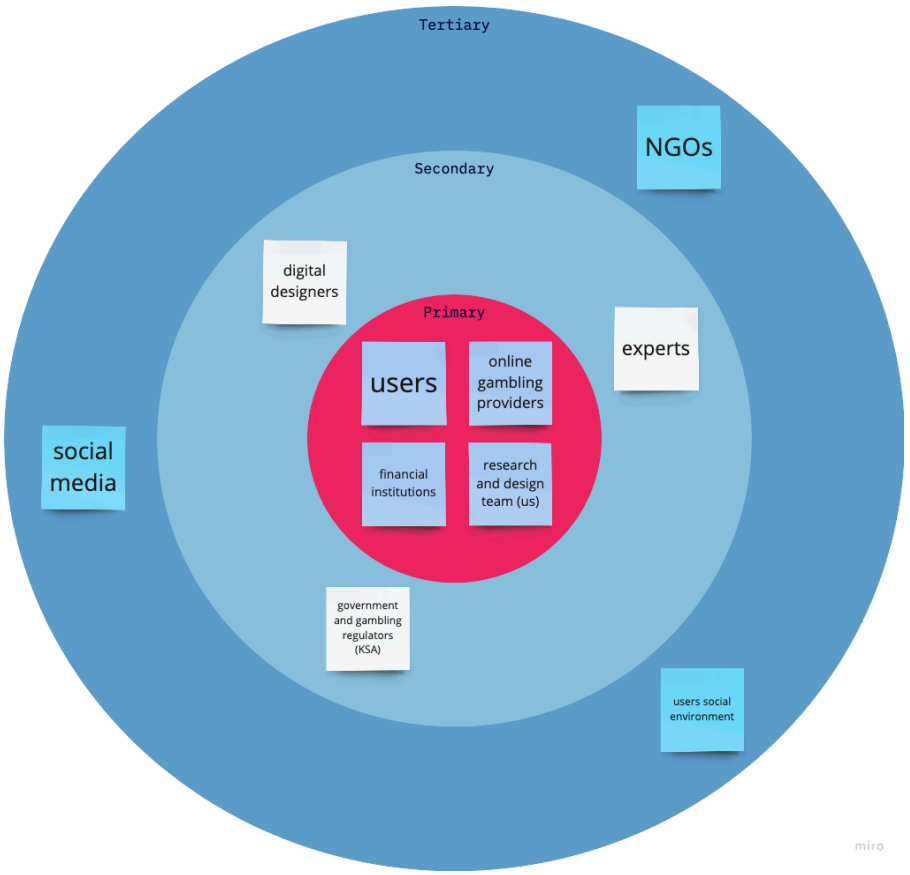

Figure 4. *Stakeholder map*

Outcomes of contextual inquiry

Our contextual inquiry allowed us to get a clear picture of the mechanisms involved in online gambling, the current state of responsible gambling interventions, and the barriers of responsible gambling behaviors. Responsible online gambling is a complex subject which involves many stakeholders that play a crucial role in the prevention and regulation of gambling behavior. In summary, the main barriers that were identified to responsible online gambling were illustrated below (Figure 5).

Figure 5. *The main barriers*

It can be observed that many contextual factors impact individual gambling behavior. However, intervening at the level of national, governmental, or financial institutions is extremely challenging to implement. Therefore, it was decided our intervention would aim at promoting responsible online gambling in Dutch young adults.

Value specification

The first step of the value specification phase was creating an affinity map with all the concepts and ideas we found relevant for our topic, while also heavily focusing on the answers our users had given us about their gambling behaviors. We all did this by writing everything down on post-its, then putting them on a whiteboard to have a better overview. We looked at the board and tried to group all concepts together, first individually and then collaboratively. There was a lot of back and forth on the categories, as some concepts could be interpreted from different points of view. In the end, we came up with five categories, namely knowing safety regulations, irresponsible behavior, responsible behavior, money-related issues, and the social aspect of gambling, as illustrated below in Figure 6.

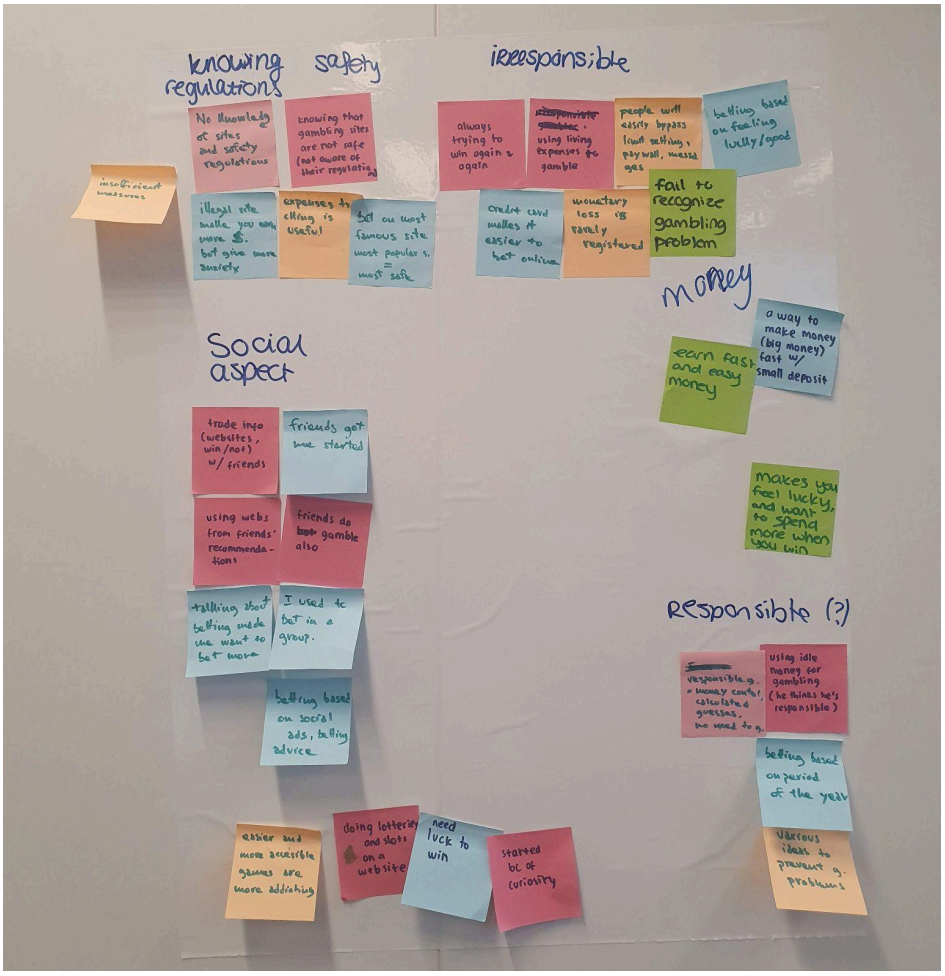

Figure 6. *Affinity map I*

However, we were still not satisfied with our groupings, and therefore we iterated the categories so that the values resulting from them would be more clear. We also left out the category of the social aspect of gambling because that is not something we could intervene on. For the other categories, we tried to see if anything caught our eye that could be translated into a value. For some of the aspects that were more salient to us, we were unsure if they were values or requirements, so we wrote them down in the middle of the board (Figure 7) and discussed them together more and also with the teacher.

Figure 7. *Affinity map II*

We always kept in mind what the users had said about their gambling behavior and about the effectiveness of possible interventions to promote responsible gambling. With this in mind, we were able to get a clearer idea of what the values, attributes or requirements are. We then made a table with all the values we found, and some general requirements for each one, as can be seen in Figure 8. It was done very quickly at the end of the workshop, and the requirements we wrote did not make a lot of sense, but we iterated on that later.

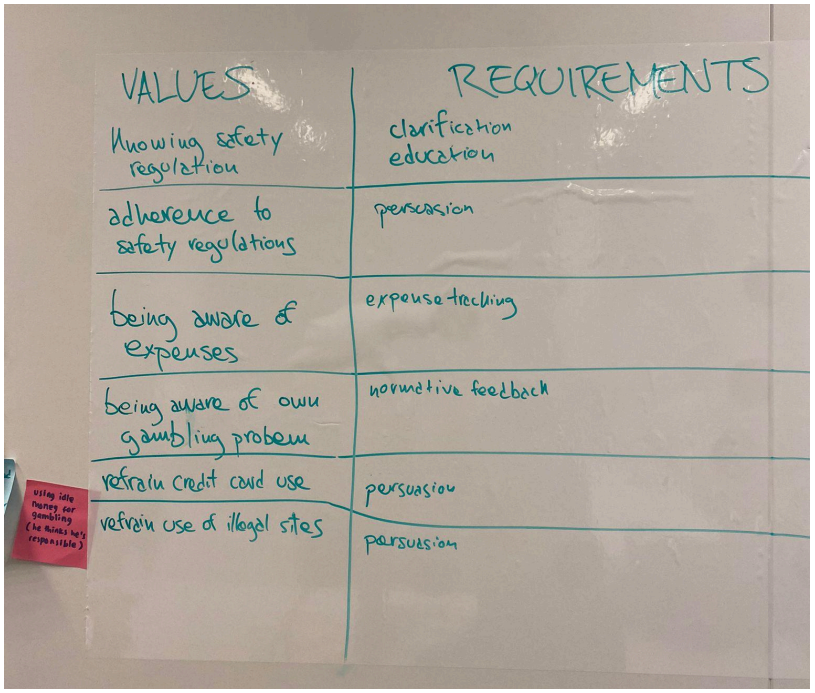

Figure 8. *Values and requirements*

At this stage, we ended up with six values, the ones illustrated above: knowing safety regulations, adhering to safety regulations, being aware of expenses, being aware of your own gambling problem, refraining from using credit cards, and refraining from using illegal websites. However, we then had a formative evaluation and we made some changes to our values. First, we took out the value of refraining from using illegal websites as we did some more desk research and found out that they are already regulated by the government, so there was no point in intervening on them. Second, we added a new value, that of a uniform approach by gambling sites. Through our desk research on gambling regulations, we realized that even though users can impose a spending limit on each website, there is always the possibility that when they hit their limits, they go on to spend money on a different website. There is no centralized registry that has all of this information in one place. We saw this as a gap which we could address with our intervention.

After this, we made a bigger table on the Miro board with the values, attributes, and requirements. We proceeded with these values to the first iteration of the design phase and started thinking about a prototype, which at this point in time was the Chrome extension we describe later in the design phase. Then, we had a meeting with an expert in the field of responsible gambling, who highlighted some areas we had not considered that we should include in our intervention.

First, they prompted us to look into the role of banks in online gambling and told us about the Dyme app, which we took inspiration from. We included this in our value “uniform approach by gambling sites”, as our idea was having one place where you can see all gambling-related expenses from every website, like how in the Dyme app you see all types of expenses in one place.

Second, they advised us we should look into hot and cold states to better understand gambling behavior. We learned that when they are not gambling, players are in a cold state and are able to evaluate options and make rational choices. However, when gambling, many players enter a hot state during which decisions are highly driven by emotions and the ability

to make rational decisions is impaired, often leading to gambling binges and problems (Spaniol et al., 2018). This information led us to include the value of targeting the rational mind, meaning we would try to reach users when they are in a cold, more rational state and would be more receptive to our intervention.

After the expert interview, we had a better idea of what we wanted our intervention to do and we started working on a new design. We realized the values of knowing and adhering to safety regulations were not part of our intervention, so we excluded them. We presented our idea to the users, who gave us the feedback that they found it useful to be able to set their own spending limit instead of it being imposed on them. This was something we had included in our design from the beginning, but we had never explicitly called it a value. Thus, we created this new value, promoting autonomy in RGF, and also took out the value of refraining from using credit cards, as this went hand-in-hand with the value of autonomy and we wanted to leave the choice of payment method up to the users.

In the end, the table we made on the Miro board with values, attributes, and requirements was larger than when we started (Figure 9).

Figure 9. *Miro board of values, attributes, and requirements*

However, only the circled values from the image above were ultimately included in our final prototype. The identified values and requirements we ended up using are summarized in Table 1 below.

Values	Requirements
Being aware of expenses	Expense tracking and statistics
Being aware of own gambling habits/activities	Time tracking and statistics Normative feedback
Uniform approach between gambling sites	Integration of information between all gambling sites and banks
Targeting the rational mind	Cold state suggestions
Promoting autonomy in RGF	Providing choices for users

Table 1. *Final values and requirements*

Designing the intervention

In the design phase of the CeHRes Roadmap, prototypes are built that facilitate the values and user requirements that were defined in previous phases. In the first iteration of the design phase, we roughly developed the idea of using a Google Chrome extension. However, after feedback and further desk- and literature research, we started a second iteration. In this second iteration, an app was designed. The following paragraphs describe the two iterations.

First iteration

The values shown in Table 1 were not the values that were defined when we entered the design stage for the first time. At that moment, the values that were identified were awareness of expenses, awareness of own gambling habits, promoting autonomy, and uniform approach by gambling sites. Translating these first values into design ideas, we immediately realized that our intervention needed to use time and money trackers that warn or disable the gambler when they reach limits. This way, users' **awareness of their expenses and gambling activities** will be raised. These trackers should work on ***all*** **gambling**

sites, rather than just the site someone is gambling on at the time. This means that our intervention should take place outside of the gambling sites, while simultaneously being able to reach the user when they are gambling on the sites.

To this end, we got the idea of using a Google Chrome extension. Chrome extensions are downloadable software systems that can run in the background on your browser. They can track the time and money you spend on websites, and block you from them once you have reached a limit. Therefore, Chrome extensions seemed a very promising type of intervention. Roughly, we formed the first ideas. We decided that users of the Chrome extension would set their own limits, then it would track the money and time that the users spend on gambling. As users would come closer to their limits, the extension would give them warnings like 'Hey! You are at 75% of your money limit!", and they would get more messages the closer they got to their limits. After exceeding them, users would also keep receiving messages stating that they had surpassed their limit.

As we gave this idea more thought, we did more literature research on Chrome extensions and met with our expert. Through further research on their workings, we realized that chrome extensions had a couple limitations. Firstly, they are not supported on all browsers. This made us realize that not all target users can be reached with this idea. Moreover, we found that to track money, users of the extension have to enter their spendings themselves. It takes time as well as willpower to manually enter the amount you spend each time on your gambling account.

A meeting with our expert also led us to critically evaluate the idea of using the Google Chrome extension. She highlighted that banks play a big role in promoting responsible online gambling. Furthermore, the difference between hot and cold states, as described before, was emphasized by our expert. These three points of critique made us formatively evaluate the Chrome extension design. We concluded that our intervention should be able to reach all people in the target group in a cold state in which they can make rational decisions, and that banks should be included in our design.

Second iteration

After revisiting the contextual inquiry and value specification phase, we redefined our values. To recap, the values at this point in time are awareness of expenses, awareness of gambling habits, a uniform approach between gambling sites and bank providers, targeting the rational mind, and promoting autonomy in the users (see Table 1 for an overview). This last value was added after the formative evaluation described above. Now, we could design a new idea based on these newly defined values and information about Chrome extensions. We were drawn in the direction of creating an app. Lots of budgeting apps exist that can track expenses from bank accounts. Users connect the apps to their bank accounts, set limits and get notifications when they exceed them. Also, on most mobile and laptop devices there are functionalities in place that measure your screen time. This screen time can be measured overall, but also per app and/or website. Therefore, all functionalities already exist and can be integrated in one app, that can **track money and time spent** on ***all*** **gambling sites together**. By sending pop-up messages, apps are able to reach users when they are gambling, as well as when they are not. Therefore, this app could **target the users in a rational state of mind**. Furthermore, autonomy and competence, aspects of the self-determination theory, are instigated by giving out badges. Badges can increase people's perceived self-efficacy. The app also **promotes autonomy of the users** by allowing them to set their own time and money limits. To **inform the users about their gambling behavior**,

the app should provide graphs and information about how much time and money they are spending on gambling, compared to time and money they spend on other purposes, like entertainment or groceries. To further illustrate our idea we created three user flows, congruent to the three ways in which the app reaches the users. The first user flow is the flow that shows functionalities within the app, and is depicted in Figure 10. The users start by downloading the app. When opening the app, they will create an account and connect the app to their bank account. Subsequently, they will fill out a survey regarding their gambling habits. This survey contains questions about how much money and time they averagely spend on gambling, as well as how often they gamble and at which moments in the week they do so. After filling out the survey, they are asked to set their limits. They can either set them themselves or choose a suggested limit that is based on research. After these steps, they can start using the app's features. The homepage contains the graphs that aim to increase their awareness of their gambling habits. They also see normative feedback and feedback about their limits. Also, they can access the help page. Here, they can find hyperlinks that lead them to other online tools that can help, like registration for CRUKS, self-tests or support groups.

Figure 10. *User flow in the app*

The app also reaches the user at moments they are gambling. This user flow is shown in Figure 11. As soon as participants open up a gambling site, they receive a message reminding them of their limits. As they gamble and get closer to their limits, they receive one message at 90%, and one at 100% of their limits. We thought a great deal about sending more than just two messages and blocking the sites as soon as they reach the limit. This would force the users to stop gambling in a more straightforward manner. However, this might cause the users to become very frustrated with the app and its workings. This could have all types of consequences: they could shift to illegal gamble providers, try to increase their limits or delete the app altogether. All these consequences lower, or in some cases even eliminate the grip we have on our users. Thus, to make sure we can keep reaching and helping them, we decided to keep the focus on increasing people's own intention to gamble less, rather than forcing people to do so. This also lines up with our value of promoting autonomy. We aim to increase this intention by raising awareness of their gambling habits, and making suggestions about lowering limits or checking out the help-page.

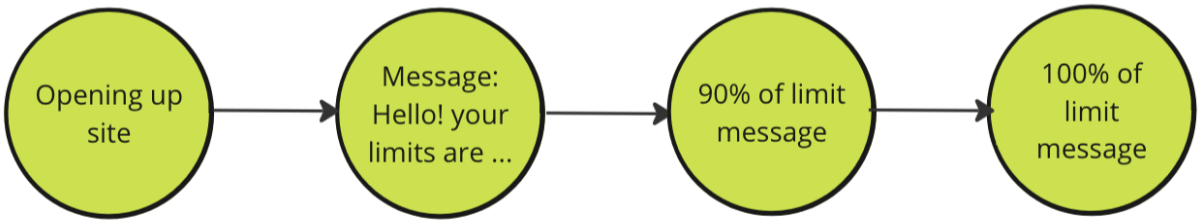

Figure 11. *User flow when gambling.*

The app also has functionalities outside of the app. The user flow that depicts the app-experience when outside the app is depicted in Figure 12. First of all, the users receive a weekly message telling them to check out their weekly report. This message nudges the user to open the app, and therefore increases the chance that the user will actually use the app and its features instead of just passively receiving notifications. Second, the user receives event suggestions. As mentioned before, in the survey they fill out when signing up to the app, they indicate the moments of the week at which they regularly gamble. Based on these moments and the location of the user, event suggestions are made. These messages are meant to inspire the user to do other things than gambling. Another type of message the users receive is a reminder of the fact that they have crossed their limit. As explained before, the user will be sent messages when they are exceeding the limits in real time, during gambling. Additionally, to facilitate the value of reaching the rational mind of the user, they also receive messages about their limit-crossing when they are not gambling anymore. The last type of message that users receive outside the app is the challenge message. This message prompts the user to lower their limits when they have stayed below them for 2 weeks.

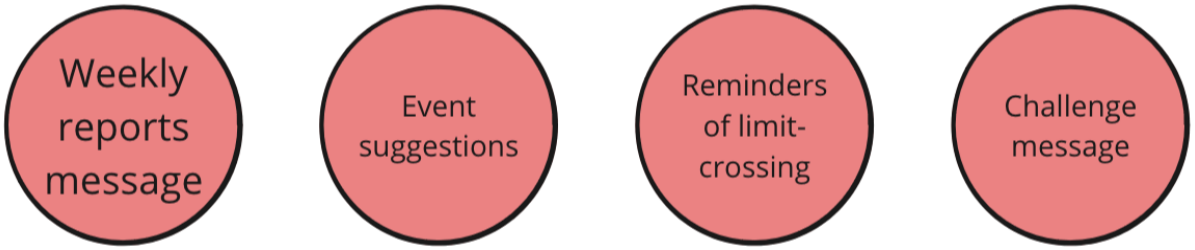

Figure 12. *User flow outside the app*

Prototyping

The prototype was created on Figma. During the whole process, we kept our goals and values in mind and implemented them in the design. Retrospectively, we divided our prototyping into three iterations. In the first iteration, we developed the basic layouts for the login, connect bank, set limits, home, statistics, and settings pages. In the second iteration, we added the badges page, designed notifications and changed a number of features that were already at place. In the last iteration, we finalized our prototype. Each iteration is further described in the following paragraphs.

The first iteration

In this phase, we created really basic designs and came up with the name of the app *"Gambless."* It originated from the words "*gamble*" and "*less*," to specify our goal in designing the app to make people gamble less. We put the logo of the app on the "Sign In/Sign Up" page. On this page, users can sign up with their email or connect their Google account. Next, they need to connect their bank account to the app. Then, they are asked to set their money and time limits before gambling. Both these actions reflect our value of **promoting autonomy in the RGFs**. By linking their bank account, it would allow the app to track their expenses related to gambling. Banks are able to recognize if transactions are related to gambling, and therefore categorize these as gambling expenses. This instigates **a uniform approach between gambling sites** since it applies to all gambling providers. Users are also given the freedom to enter their limits. The designs are presented in Figure 13 below.

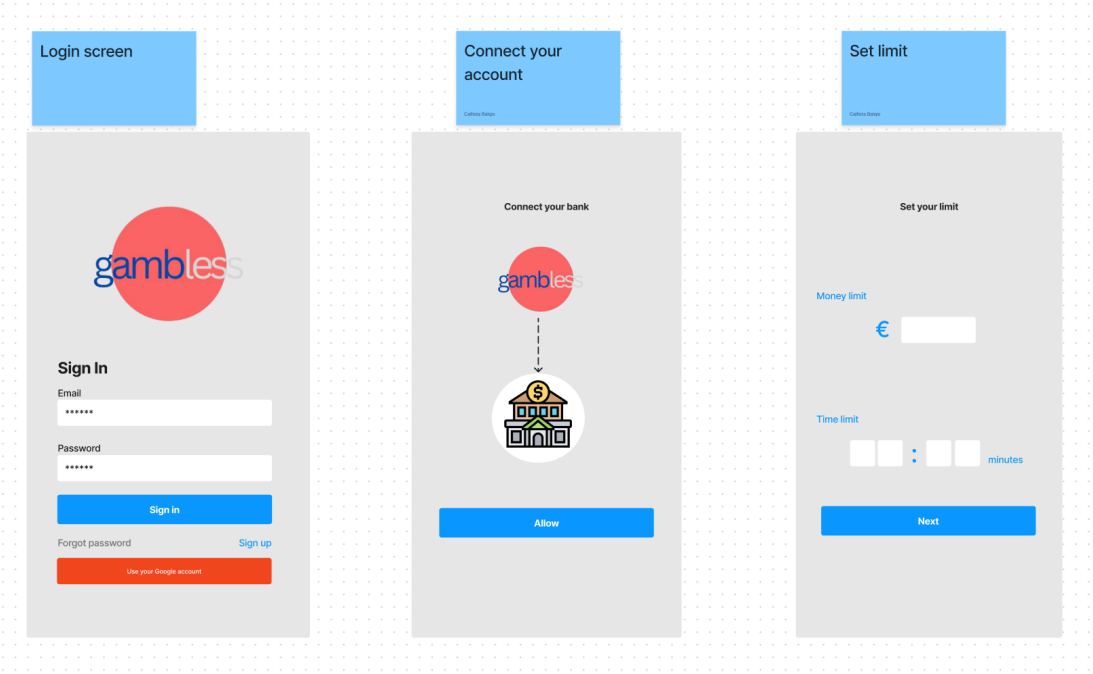

Figure 13. *The starting pages*

In this first version of our prototype, the homepage has three main features: Home, Statistics, and Settings. On the Home page, information is provided about the money and time limit that the users decided on previously, along with a historical graph of their monthly time and money spent on gambling. We also put some positive feedback for the users, such as *"This week you spent money below your limit! Good job!"* to encourage them to keep up the good behavior. On the Statistics page, there are more detailed graphs of expenses and time spent. This feature increases **awareness of expenses and gambling habits.** We also highlight the users' lowest money and time spent on gambling and label them as "Your Record" because we want them to feel a sense of competence and accomplishment and therefore encourage them to stay within their limits and spend less time and money. Positive feedback is also given to reinforce the behavior, such as *"You're doing good! Keep up the good work!".*

On the Settings page, users can edit their profile, limits, and bank account. We also added a notification setting to give the users a choice of how many times they want

notifications to appear on their phones or websites, for example, they can choose if they want to receive warning messages when they reach either 75%, 90%, or 100% of their limits or the three of them. This is because we wanted the users to receive warnings on their phones and websites of how much percentage was left of their money and time limits during gambling. Additionally, the Privacy & Policy option provides information regarding data collection and privacy. The layouts can be viewed below (Figure 14).

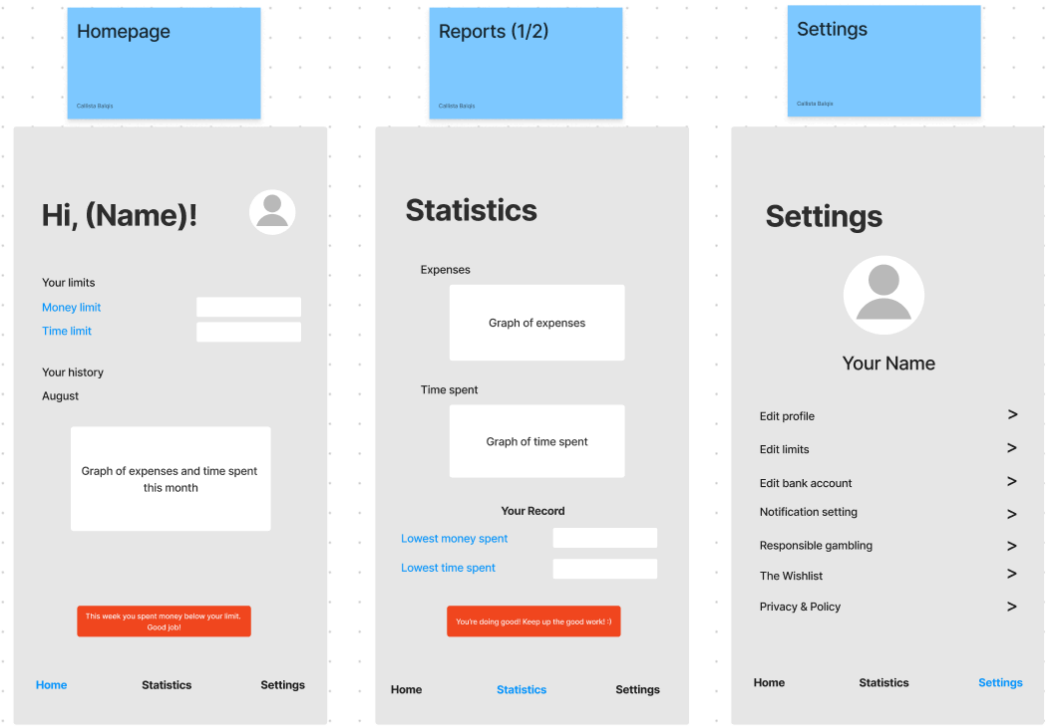

Figure 14. *The home, statistics, and settings pages in the first iteration*

Lastly, we proposed a My Wishlist section where users can write down their wishlist or upload pictures. We planned to link their wishlist to their expenses to make them aware of their spending using a message such as "*Hey! You have lost too much money. You won't be able to buy this (e.g. shoes) anymore!*".

The second iteration

In the second iteration, we made a number of changes in terms of the homepage, timing and content of notifications, and limit setting. We also added the help-page as well as badges. The badges are meant to increase the users' sense of accomplishment.

First of all, one of the major changes we made was replacing the Statistics page with Reports on the homepage. The idea was presenting the graphs of time and money spent, but more in detail. Users are presented with bar graphs about their spent money and time as well as a comparison of their gambling expenses to other expenses. Users can select daily, weekly, or monthly periods of the reports. Additionally, they receive normative feedback messages such as *"This week you spent 75% below the average of your age group. Good job!"* as a form of motivation (Figure 14). We chose to include normative feedback to encourage gamblers to think critically about their own gambling habits, potentially helping them decrease gambling (Berge et al., 2022).

Secondly, we also added a badges page where users can see the badges they collected as a reward for reaching a milestone. The idea was gathered after a discussion with a guest lecturer during one of the workshops. Each badge has a description of the achievement. When achieved, the badge becomes colorful in the app, and the users receive a message congratulating them. The black ones are yet to be attained. The purpose of this page is to reward and reinforce the users' positive behavior. A glimpse of the collected badges will be displayed on the Home page, so they will be visible upon opening the app (Figure 15).

Figure 15. *The revised home, reports, and badges pages*

Thirdly, adjustments were made to the notifications after a discussion with the teachers and users. We originally wanted to make the warning notifications appear solely when users were gambling. When asked about this, the users said they would simply ignore them. The teachers also had similar opinions because when gambling, players enter a "hot state" in which they tend to disregard their surroundings. Therefore, we decided to also send the notifications during the "cold state," when users are not gambling. **Targeting the rational mind** is one of the values we identified, and users are more likely to make rational decisions in that condition. Hence, in addition to warning messages during gambling, we also decided to send messages about limit-crossing when users are in a cold state. Tapping those messages will lead users to the relevant pages on the app. The notification will take them to a website that provides the information. We also included a notification to challenge users to lower their limits after successfully staying below them for 2 weeks.

We decided to keep sending warning messages when users were gambling because we thought it was still important to provide them with feedback on how much money and time they had spent. To avoid annoying the users and risking that they delete the app as a result, we reduced the number of messages in the hot state from four to just two. Now, users only get messages when having reached 90% and 100% of their limits. The illustrations are presented below (Figure 16).

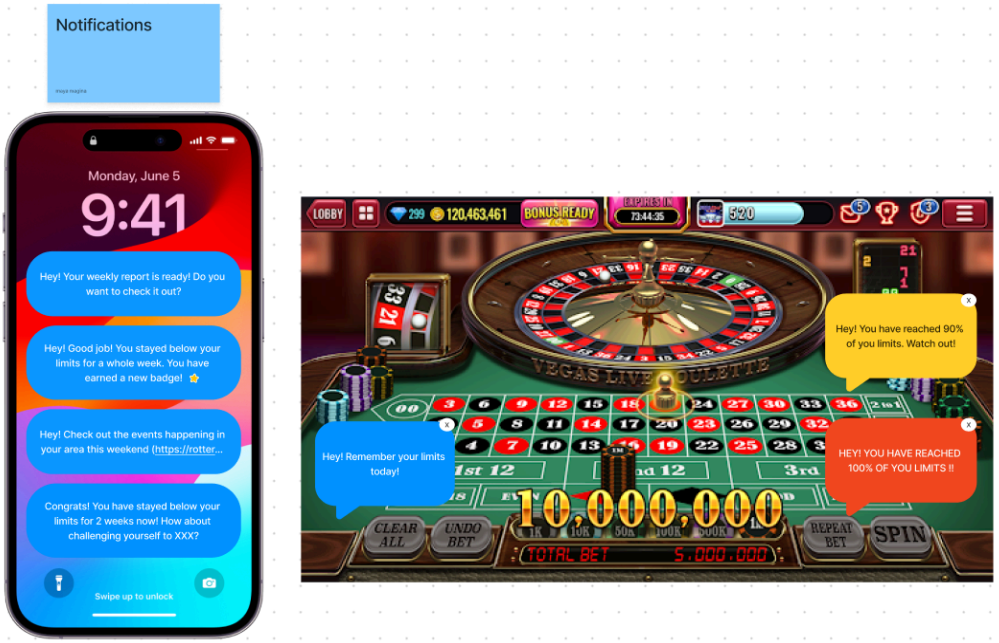

Figure 16. *The notifications*

Fourth, we introduced the Gambling Help page by integrating hyperlinks to the gambling addiction test, registration for CRUKS, and anonymous help. The website for the gambling addiction test offers a quick assessment for users to determine whether they need help with their gambling behavior. As explained previously, registration for CRUKS instigates a gambling ban across all online and offline gambling providers. Lastly, anonymous help is available for those seeking further assistance with gambling problems (Figure 17).

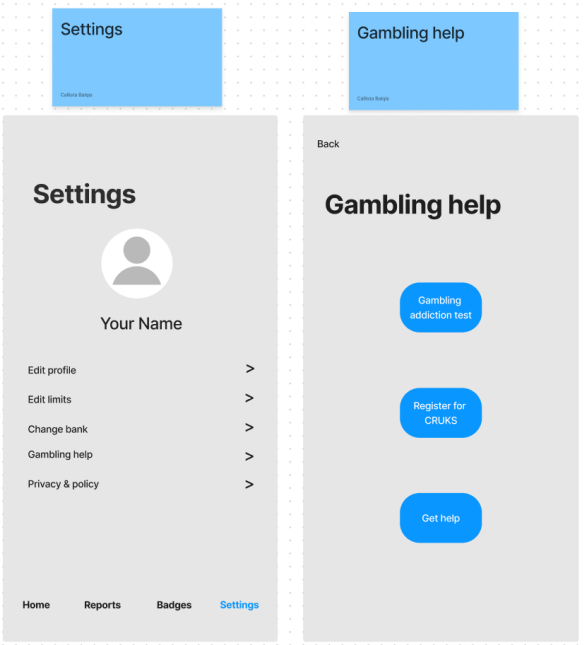

Figure 17. *The settings and gambling help pages*

Lastly, we made minor improvements in the limit setting option. We included options for users to choose between daily, weekly, and monthly limits as well as a button for suggested limit options on the Set Limit page. We also implemented maximum limits that

users can enter to prevent them from entering unrealistic limits. Users can also change their time and expense limits and bank accounts. Lowering the limit can be done always, but raising them can only be done once every 3 months. The Edit Limits page will be locked and inaccessible during gambling (Figure 18).

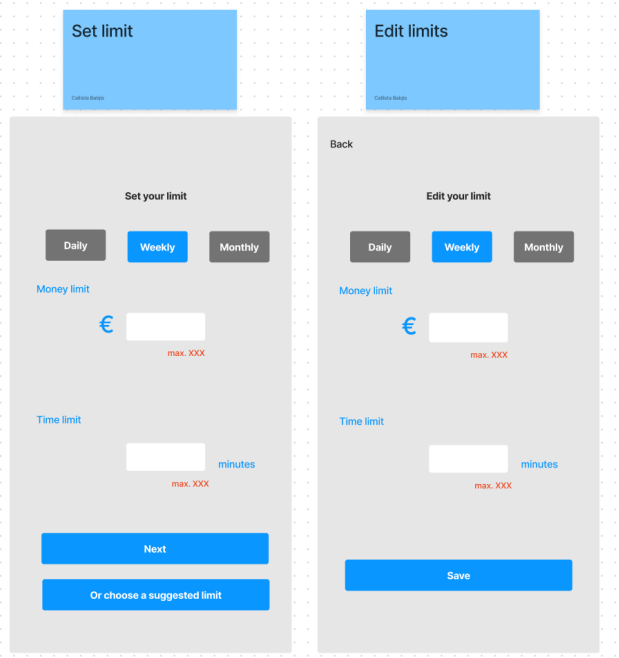

Figure 18. *The set and edit limits page*

The third iteration

In the third and last phase of creating the prototype, we decided to add the survey that users have to fill out after downloading the app. Answers to this survey will be used to enable tailored messages that the users will receive. These notifications contain suggestions for events that take place in their location at the moments they regularly gamble. This distracts them from engaging in gambling activities. Another last change we made was the fact that we replaced My Wishlist with 'My Goal,'. After the final presentation, we received feedback from our expert to include a long-term goal in terms of time and money spent on gambling. A long-term goal will motivate users to keep gradually lowering their limits. The comparison between the users' long-term goals and their actual behaviors can be seen on the Reports page. Users can specify their long-term goal in terms of the amount of money and time that they ideally would like to spend on gambling. The Wishlist was initially included to keep users motivated to stay below their limits. However, we discarded the idea because the users found it stressful to directly see the effect their gambling behavior has on their chances of accomplishing wishes. All the layouts described are illustrated in Figure 19.

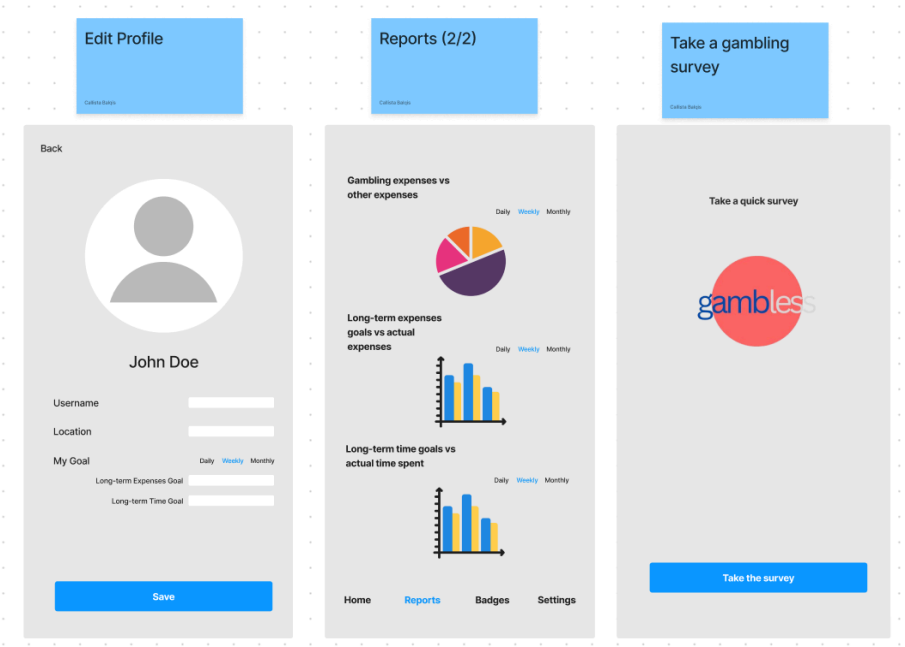

Figure 19. *The profile, reports, and survey pages*

Conclusion

In conclusion, we used the CeHReS Roadmap to create and design an intervention aiming to promote responsible online gambling amongst Dutch young adults. To this end, we created Gambless, an app that allows users to set time and money limits, encourages them to engage in activities other than gambling, raises user's awareness about their gambling habits, and provides easy access to help regulations in the Netherlands. We believe this intervention could successfully help gamblers remain recreational gamblers, preventing them from losing control over the time and money they spend on gambling.

References

American Psychiatric Association (2022). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., text review). https://doi.org/10.1176/appi.books.9780890425787

Berge, J., Abrahamsson, T., Lyckberg, A., Franklin, K., & Håkansson, A. (2022). A normative feedback intervention on gambling behavior—A longitudinal study of post-intervention gambling practices in at-risk gamblers. *Frontiers in Psychiatry*, *13*, 602846. https://doi.org/10.3389/fpsyt.2022.602846

Braverman, J., LaPlante, D. A., Nelson, S. E., & Shaffer, H. J. (2013). Using cross-game behavioral markers for early identification of high-risk internet gamblers. *Psychology of Addictive Behaviors*, *27*(3), 868–877. https://doi.org/10.1037/a0032818

Braverman, J., & Shaffer, H. J. (2010). How do gamblers start gambling: identifying behavioural markers for high-risk internet gambling. *European Journal of Public Health*, *22*(2), 273–278. https://doi.org/10.1093/eurpub/ckp232

Drosatos, G., Arden-Close, E., Bolat, E., Vuillier, L., & Ali, R. (2018). Gambling Behaviour Data and Modalities of Persuasive Interaction for Enabling Responsible Online Gambling. *Bournemouth University*. http://eprints.bournemouth.ac.uk/31539/

Floros, G. (2018). Gambling disorder in adolescents: prevalence, new developments, and treatment challenges. *Adolescent Health, Medicine and Therapeutics*, *Volume 9*, 43–51. https://doi.org/10.2147/ahmt.s135423

Gainsbury, S. (2015). Online Gambling Addiction: the Relationship Between Internet Gambling and Disordered Gambling. *Current Addiction Reports*, *2*(2), 185–193. https://doi.org/10.1007/s40429-015-0057-8

Gainsbury, S., Angus, D. J., Procter, L., & Blaszczynski, A. (2019). Use of consumer protection tools on internet gambling sites: customer perceptions, motivators, and barriers to use. *Journal of Gambling Studies*, *36*(1), 259–276. https://doi.org/10.1007/s10899-019-09859-8

Gainsbury, S., Black, N., Blaszczynski, A., Callaghan, S., Clancey, G., Starčević, V., & Tymula, A. (2020). Reducing internet gambling harms Using Behavioral Science: a Stakeholder framework. *Frontiers in Psychiatry*, *11*. https://doi.org/10.3389/fpsyt.2020.598589

Gainsbury, S., Parke, J., & Suhonen, N. (2013). Consumer attitudes towards Internet gambling: Perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites. *Computers in Human Behavior*, *29*(1), 235–245. https://doi.org/10.1016/j.chb.2012.08.010

Griffiths, M. D., Wood, R. T. A., & Parke, J. (2009). Social Responsibility Tools in Online Gambling: A Survey of Attitudes and Behavior among Internet Gamblers. *Cyberpsychology & Behavior*, *12*(4), 413–421. https://doi.org/10.1089/cpb.2009.0062

Haefeli, J., Lischer, S., & Schwarz, J. (2011). Early detection items and responsible gambling features for online gambling. *International Gambling Studies*, *11*(3), 273–288. https://doi.org/10.1080/14459795.2011.604643

Hollén, L., Dörner, R., Griffiths, M. D., & Emond, A. (2020). Gambling in young adults aged 17–24 years: A Population-Based Study. *Journal of Gambling Studies*, *36*(3), 747–766. https://doi.org/10.1007/s10899-020-09948-z

Kim, H. S., Wohl, M. J. A., Gupta, R., & Derevensky, J. L. (2017). Why do young adults gamble online? A qualitative study of motivations to transition from social casino games to

online gambling. *Asian Journal of Gambling Issues and Public Health*, *7*(1). https://doi.org/10.1186/s40405-017-0025-4

Kip, H., & Van Gemert-Pijnen, L. (2018). Holistic development of eHealth technology. In *Routledge eBooks* (pp. 131–166). https://doi.org/10.4324/9781315385907-7

Mazar, A., Zorn, M., Becker, N., & Volberg, R. A. (2020). Gambling formats, involvement, and problem gambling: which types of gambling are more risky? *BMC Public Health*, *20*(1). https://doi.org/10.1186/s12889-020-08822-2

Messerlian, C., Byrne, A. M., & Derevensky, J. L. (2004). Gambling, youth and the internet: should we be concerned? *PubMed*. https://pubmed.ncbi.nlm.nih.gov/19030146

Riley, B., Oster, C., Rahamathulla, M. a. R., & Lawn, S. (2021). Attitudes, Risk Factors, and Behaviours of Gambling among Adolescents and Young People: A Literature Review and Gap Analysis. *International Journal of Environmental Research and Public Health*, *18*(3), 984. https://doi.org/10.3390/ijerph18030984

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066x.55.1.68

Shah, P., Quilty, L. C., Kim, J., Graff-Guerrero, A., & Gerretsen, P. (2019). Impaired Awareness of Problem and Pathological Gambling: A review. *Journal of Gambling Studies*, *36*(1), 39–50. https://doi.org/10.1007/s10899-019-09926-0

Spaniol, J., Di Muro, F., & Ciaramelli, E. (2018). Differential impact of ventromedial prefrontal cortex damage on "hot" and "cold" decisions under risk. *Cognitive, Affective, & Behavioral Neuroscience*, *19*(3), 477–489. https://doi.org/10.3758/s13415-018-00680-1

Swanton, T. B., Gainsbury, S., & Blaszczynski, A. (2019). The role of financial institutions in gambling. *International Gambling Studies*, *19*(3), 377–398. https://doi.org/10.1080/14459795.2019.1575450

Van Gemert-Pijnen, J. E., Nijland, N., Van Limburg, M., Ossebaard, H. C., Kelders, S. M., Eysenbach, G., & Seydel, E. (2011). A holistic framework to improve the uptake and impact of eHealth technologies. *Journal of Medical Internet Research*, *13*(4), e111. https://doi.org/10.2196/jmir.1672

Wood, R., Shorter, G. W., & Griffiths, M. D. (2014). Rating the suitability of responsible gambling features for specific game types: A resource for optimizing responsible gambling strategy. *International Journal of Mental Health and Addiction*, *12*(1), 94–112. https://doi.org/10.1007/s11469-013-9473-y

Wood, R. T., & Williams, R. J. (2011). A comparative profile of the Internet gambler: Demographic characteristics, game-play patterns, and problem gambling status. *New Media & Society*, *13*(7), 1123–1141. https://doi.org/10.1177/1461444810397650