



BACHELOR THESIS

DESIGNING AN ONLINE CAMPAIGN TO ACTIVATE INHABITANTS OF ENSCHEDE, TO ADOPT THE RAIN TOWER SOLUTION

AUTHOR: M.R. NOORDENBOS
s1879367

CREATIVE TECHNOLOGY
EEMSC FACULTY

SUPERVISOR: Dr. K. ZALEWSKA
CRITICAL OBSERVER: ir. ing. R.G.A BULTS

JULY, 2019

UNIVERSITY OF TWENTE.

Abstract

Enschede is suffering from rainwater management problems, of which the amount increases because of climate change and the city's geographical location. Therefore, the municipality of Enschede, waterboard Vechtstromen and the University of Twente joined forces in the Raintower project. This project exists of a network of Smart Rainwater Buffers as a result of previous projects. The Rainwater project needs involvement from inhabitants, which is to achieved with an online campaign answering the "What's in it for Enschede"-question. The goal of this project is to design this campaign and activate inhabitants of Enschede to adopt the Raintower solution. First a background research is conducted to answer sub questions concerning evoking activating emotions, current environmental awareness, similar campaigns, etcetera. After concluding findings of the background research, the Creative Technology Design Process is used as a thread in developing the online campaign. From stakeholders and previous research, requirements are retrieved and later implemented in the design. Chosen is to let the online campaign be an animation. Concepts are elaborated and a Lo-Fi prototype is created to get relevant feedback on. After realizing and evaluating the final concept, concluded is that the animation is accessible, bright-colored, simplistic and explanatory, which makes it effective in activating inhabitants of Enschede.

Acknowledgements

I would like to extend my sincere thanks to my supervisor Kasia Zalewska and critical observer Richard Bults who were available during the whole process to provide feedback and help with important decisions. I am also so grateful to my fellow student Suzan Antvelink who always supported me in good and bad times by discussing my problems or pushing me back in the right direction. Additionally, Hendrik-Jan Teekens, Nicolette Hoogeveen and Jeroen Buitenweg need to be acknowledged for their contribution to this project too, by representing the stakeholders and cleared their agenda to meet with me.

Table of Contents

Abstract	1
Acknowledgements	1
Chapter 1: Introduction	4
1.1 Context	4
1.2 Challenge.....	5
1.3 Research Questions.....	6
1.4 Outline.....	6
Chapter 2: Background Research.....	7
2.1 Literature Study.....	7
2.2 State of the Art.....	11
Chapter 3: Methods and Techniques	16
3.1 Type of Online Campaign.....	16
3.2 Creative Technology Design Process (CTDP).....	16
3.3 Ideation	17
3.4 Specification.....	20
3.5 Realization.....	21
3.6 Evaluation	21
Chapter 4: Ideation.....	23
4.1 Stakeholder analysis	23
4.2 Preliminary Requirements.....	26
4.3 Preliminary requirements	29
4.4 Scenario.....	30
4.4 Preliminary Concepts	31
Chapter 5: Specification	34
5.1 Final storyline	34
5.2 Storyboard.....	35

5.3 Lo-Fi Prototype	36
5.4 Final Requirements	38
Chapter 6: Realization.....	40
6.1 Visual Software	40
6.2 Audio software.....	41
6.3 Workflow.....	41
6.4 Conclusion	44
Chapter 7: Evaluation	46
7.1 Stakeholder Meeting.....	46
7.2 Non-functional Requirements Evaluation	46
7.3 Functional Requirements Evaluation	48
7.4 Conclusion	50
Chapter 8: Conclusions and Future Work	51
8.1 Conclusions.....	51
8.2 Future Work	52
References	53
Appendices	57
Appendix A: Stakeholder Meetings.....	57
Appendix B: Ideation Concepts	60
Appendix C: Final Storyboard.....	64
Appendix D: Script.....	65

Chapter 1: Introduction

This first chapter will provide an introduction to this graduation project. The context will be described in order to create a clear image of the problem. This is followed by an explanation of the challenge that will be faced in this project. From this challenge, research questions arose, which are defined after. Finally, an outline of the rest of the report is given with a short summary of what to expect in the next chapters.

1.1 Context

Enschede is a varied city in the east of the Netherlands. The city is called home by nearly 160.000 inhabitants. Those inhabitants experience an average of almost 200 days of rain per year (CBS, PBL, RIVM & WUR, 2019). This amount of rain is common in the rest of the country, but the geographical location of Enschede causes problems in rainwater management. The fact that the city is built on a gentle slope contributes to additional strain on the sewerage system of the lower areas. After a day of heavy rainfall, the lower streets turn into streams of a few centimetres deep. Inhabitants are forced to get home by crossing the water with their bikes or cars, and when they arrive, their house is probably also damaged by the flood. Figure 1 is a clear representation of an example where the sewerage system in the Varviksingel cannot handle the amount of water (Tubantia, 2010).

The municipality of Enschede recognize these rainwater management problems and already set up projects to prevent these inconveniences and waste of water, but these are time- and money consuming and the inhabitants are not personally involved. As the amount of short heavy rainfalls will increase due to climate change in the next years (Gemeente Enschede, 2018), the municipality of Enschede is for instance supporting the creation of a water storage below the Oldenzaalsestraat with a capacity of 3.5 million litres. Additionally, next to the street, there will be placed wadi's with also an overall capacity 3.5 million litres.

Another example of a measure the municipality took is the Stadsbeek (1Twente, 2017). The districts Stadsveld and Pathmos are struggling with floods a lot because both are located at the bottom of the moraine (Wareco Ingenieurs, n.d.). 1Twente (n.d.) explains that this urban stream discharges redundant water into the Tweekelerbeek after which it ends up in the Twentekanaal. Wareco Ingenieurs (n.d.) stated that the urban stream will contribute to the quality of life and the increase of the biodiversity.

Projects at the University of Twente resulted in a new way of tackling this problem. One where the inhabitants of Enschede are involved and even necessary for the project to work. The idea of a smart rainwater buffer (SRB) was created and carried out (Bults, Teekens & Buitenweg, 2019). This water reservoir, with a volume of 250 litres, is placed in the garden and buffers rainwater which it receives from the drainpipe, connected to the gutter. This way, the sewerage system is not burdened with a huge amount of water at once during heavy rainfall. The buffer releases water, when the

sewerage system is not yet strained, in order to make place when a rain shower is coming up. The buffered water can be reused as for instance cleaning water, or to water plants. A standard rainwater barrel is made smart, which distinguishes it from a normal water reservoir. It knows, by means of an integrated weather forecast whether a heavy rain shower is coming up and will prepare itself by releasing water in advance. Additional features as a temperature sensor make it easier and more save to reuse the buffered rainwater.

In order for the SRB to work for the greater good, it needs to be used in a network of SRB's. waterboard Vechtstromen, the municipality of Enschede and the University of Twente joined forces in the Raintower project. The goal of this project is to create the same effect as a traditional water tower with the use of a network of SRB's in inhabitants gardens.



Figure 1. The sewerage system in the Varvikingel cannot handle the amount of water (Photo: Stephan Scheper)

1.2 Challenge

The target group for the SRB is very broad and people will be motivated by different principles to buy one (Charizanis, 2019). Charizanis (2019) found that user acceptance and usage behaviour are influenced by performance expectancy, effort expectancy, social influences and facilitating conditions.

These factors are divided over three different approaches of introducing the SRB to potential users. At first, “What’s in it for me?”, focusing on the advantages for the individual. Charizanis (2019) did research in this field and created an animation that needs to attract the inhabitants of Enschede. Secondly, “What’s in it for us?”, will show the advantages for- and create all kinds of communities within Enschede. The third approach builds on the question “What’s in it for Enschede?”, which will be handled in this project. Firstly, the inhabitants of Enschede need to be aware of the problem and its increasing significance. Secondly the inhabitants of Enschede need to feel that they are involved in the problem solving when working together, using SRB's, and therefore be motivated to purchase one.

1.3 Research Questions

Motivating the inhabitants will be done by focusing on social influence, perceived usefulness and facilitating conditions. The goal is to find an answer for the research question *“How to activate inhabitants of Enschede, by means of an online campaign, to adopt the Raintower solution?”*.

In background research will be searched for answers on the following sub questions: “How are people adopting Rainwater Harvesting (RWH) applications these days, and what factors influence this process?”, “What is the status of environmental awareness of inhabitants and how can this be influenced?” and “What is an effective way to involve inhabitants into the Raintower project and what is the added value of this?”.

1.4 Outline

This graduation project follows certain steps to get an answer on the research question and a suitable end product. In the following chapters, outcomes and motivations of different steps are described.

Chapter 2: Background Research starts with a literature study, in which the focus lies on retrieving information from earlier research. Additionally, comparable projects are analysed and discussed.

Chapter 3 deals with the methods and techniques used in the rest of the project. The Creative Technology Design Process is followed during the design phase and is explained in this chapter. In the next chapters, the stages of this process are elaborated. Followed by a conclusion and possibilities for further research.

Chapter 2: Background Research

This chapter is divided in two parts. Firstly, literature is studied to retrieve answers on certain sub questions and to see what can be learned from previous research and can be applied in this project. In the second part, existing, similar projects are described, analysed and discussed.

2.1 Literature Study

In order to spread the message of the Raintower project in Enschede, the form of the campaign needs to be thought through. The objective of this literature study is to consult about the formation of an online campaign which will make inhabitants of Enschede aware of the current environmental issues and activate them to adopt the Raintower solution. Sub questions that can be of support in this study are “How are people adopting Rainwater Harvesting (RWH) applications these days, and what factors influence this process?”. In addition to this there will also lie focus on general environmental awareness of consumers and how people are motivated by inventions in this field. Furthermore, there will be searched for an answer on the question “What is an effective way to involve inhabitants into the Raintower project and what is the added value of this?”.

2.1.1 Current Rate of Adoption of Rainwater Harvesting

The average individual in the Netherlands uses 100 litres of clean drinking water a day, of which only 1,5 litre is actually consumed as drinking water (Trouw, 2007). The demand for water is still rising, caused by population growth and changes in lifestyle (Environment Agency, 2010). Together with the rising demand for water, the amount heavy rain showers also increases, due to climate change (Zhang, Zhang, Yue, & Jing, 2019). On the face of it, the combination of more rainfall and an increasing demand for water does not seem to be a problem. However, if in those heavy rain showers water is not buffered or used effectively, it goes to waste. If every household would adopt and harvest rainwater in such a shower, the problem would be reduced extremely.

One question concerning the formation of the campaign is about the factors influencing the adoption to new innovations. Khastagir and Jayasuriya (2010) conducted a research in Australia and make clear that many local households are interested in using rainwater as an alternative source of water, hence the increase of ecological education. They suggest that more education and therefore environmental awareness generates more interest in the RWH applications. Assuming the theory of Khastagir and Jayasuriya (2010) is applicable, a new question arises. What is the current state of general knowledge concerning RWH in the Netherlands?

Heavy rainfall is not unusual in the Netherlands (KNMI, n.d.). According to Hofman et al. (2019), water utilities are observing societal trends in domestic efforts for e.g. rainwater harvesting. Khastagir and Jayasuriya (2010) enlighten that the amount of rainfall in an area is a variable with a big

role that influences the decision whether to buy an RWH application. This would mean that the general interest is high in the Netherlands and could possibly be increased by confronting people with the waste of redundant rainwater. Hofman et al. (2019) state that RWH applications are in development, but that RWH for drinking water still needs a robust disinfection treatment, which is not yet suited for domestic use. Although, there are a lot of other ways to reuse the harvested water.

2.1.2 Improving Ecological Consciousness of Inhabitants

One goal of the online campaign is to make people aware of the rainwater management- and environmental problems. Brochado et al. (2016), explain that people are more environmentally aware these days and that this is caused by several factors including the amount of reported disasters. This could mean it would contribute to focus on the problem statement, while efficiently spreading the message of the Raintower project. Examples included by the problem statement are: the flooding and drinking water waste. A study of Heath (1996) shows that people are more likely to share exaggerated bad (or good) news, which also suggests to confront the viewers with the problem and the tragic consequences.

Additionally, Berger and Milkman (2012) build on this theory and looked into more specific emotions. They found that content which evokes a deactivating emotion is less likely to be social transmitted and go viral rather than activating content. Anttila, Pyhältö, Soini and Pieatarinen (2017) enlighten the differences between activating and deactivating content. Examples of activating emotions they give which are applicable on this project are both positive and negative: hope, enthusiasm, anger, anxiety and shame. These emotions should be evoked by the campaign. They show that feedback (social support), personal accomplishment, expectancy value and problem solving play big roles in creating activating emotional patterns.

2.1.3 Environmental Aware Consumer Behaviour

Brochado et al. (2016) show that the consumer behaviour has changed from an individual focus into a broader view which takes the environment into account when purchasing a product. According to Brochado et al., the role of green marketing has become crucial. Hereby firms look at a combination of satisfying consumers' needs and at the same time show what they contribute to the behold of the environment. Therefore, in the case of the Raintower project campaign, this combination should be communicated to the potential consumers. A combination of the problem statement and the personal benefits they will earn.

The aim is to promote a certain behaviour and call the viewer to action. McKenzie-Mohr (2000) set up three questions one should ask when deciding which behaviour to promote in social marketing: "What is the potential impact of the behaviour?" (pp. 547), "What barriers exist to engaging in these activities?" (pp. 547) and "Do the resources exist to overcome the identified

barriers?” (pp.547). These questions and their answers can be used during the forming of the campaign, in order to stay on the most effective track.

2.1.4 Increase of Civil Involvement

In order to make the Raintower project work, it is important to not only campaign the SRB and ask people to buy it. It is crucial to let the inhabitants feel involved in the project. Citizen participation positively affects a project because it enhances democracy and therefore social cohesion (Michels & De Graaf, 2017). “It contributes to the inclusion of individual citizens in the policy process (inclusion), it encourages civic skills and civic virtues (civic skills and virtues), it leads to rational decisions based on public reasoning (deliberation) and it increases the legitimacy of the process and the outcome (legitimacy)” (pp.875-876).

Creighton (2005) also did research in public participation. He points out that besides using scientific research tools to message people about certain subjects, it is important to show the public interest. This public interest can be defined as “the greatest good for the greatest number” (pp.14). If it is clear that this is taken into consideration, the involvement will start with a stronger base.

Furthermore, Creighton (2005) states that when citizens are truly integrated in a process, they should be involved from the beginning. He states that, together coming up with a solution is the most effective way of public participation. The Raintower project was set up as a solution for the floods, so this step of decision making is already done without strong involvement of the inhabitants. On the other hand, there is a significant difference in involvement when looking at projects like the Oldenzaalsestraat, where inhabitants only participated in via paying tax-money.

When it comes to how to involve the inhabitants, in the first phase, it is all about attractiveness. People need to remember what they saw and what message was told. Michels and De Graaf (2017) add that it is important to not forget the impact of fun. It need to be shown how much enjoyable it is to join the Raintower community. They describe that fun is a powerful source of energy and that it is important to celebrate achieved successes together.

2.1.5 Conclusion

The goal of this literature study was to use literature to support the development of an online campaign which will make inhabitants of Enschede aware of the current environmental issues and activate them to adopt the Raintower solution. From analysing the high amount of waste of drinking water in combination with the willingness of many households to live more sustainable (Khastagir & Jayasuriya, 2010), there was concluded that it could be effective to discuss this topic in the online campaign. Potential users will be confronted with these facts and the threshold to contribute to the solution of these problems will appear to be low. They only need to buy an SRB and reuse buffered water. Moreover, inhabitants of Enschede will probably be even more adoptive because of the heavy

rainfall and consequences of the poor rain water management, when following the theory of Khastagir and Jayasuriya (2010).

After comparing different theories, advised could be to first clearly show the problem, make a heavy impression, so people are more likely remember and share the message, but end the video with more positive content. This part will show the solution and consequences of general usage of the SRB and the adoption of the Raintower project. Ways to evoke activating emotions as anger and enthusiasm could be a topic for further research in the user testing phase or be observed in existing initiatives.

One way to integrate the inhabitants in the project is to make them be part of decision making processes. A way needs to be found to show in the campaign that the inhabitants are necessary for the project to work. This will motivate them.

In order to use the theory of McKenzie-Mohr (2000), the three stated questions need to be answered. First, “What is the potential impact of the behaviour?” (pp. 547). In this case primarily the impact will be the reduction of floods and secondarily less waste of drinking water. The second question, according to McKenzie-Mohr (2000) is “What barriers exist to engaging in these activities?” (pp. 547). The answer to this question could be the fact that people will not feel like making a difference when they are the only ones using an SRB in their neighbourhood. Secondly, the price of the SRB will be high for a smart rain barrel. McKenzie-Mohr’s third question is “Do the resources exist to overcome the identified barriers?” (pp.547). The first barrier needs to be tackled with communication. If that is done in the right way, then for instance people will not see it as a bad thing but as a motivation to activate others to buy the SRB. Money issues are partly solved by the fact that the municipality will pay for the smart components of the installation. The focus of the campaign will lie on people who are already motivated to purchase for a rainwater barrel.

2.2 State of the Art

Much can be learned from existing projects. A systematic approach will be used to obtain the most information about different parts of this project. At first there will be looked deeper into existing projects in Enschede concerning rainwater management (RWM). Secondly, similar campaigning projects will be analysed in which illustrations or animations were used to create general awareness.

2.2.1 Rainwater Management (RWM) Projects in Enschede

The Oldenzaalsestraat and its direct surroundings are burdened during and after heavy rainfall (Gemeente Enschede, 2019). Due to climate change, these problems will increase in the future, which is why the municipality of Enschede choose to invest in an underground sewerage water buffering system which can store 3.5 million litres. The moment this enormous sewer pipe cannot handle the amount of rainwater, wadi's will buffer until an additional amount of 3.5 million litres. Wadi's will be dug next to the main road. This green aspect is a unique example of a solution which also contributes to the aesthetics of the city. The municipality communicates the progress and goals of this projects with the use of visuals, which makes it easier to understand for the inhabitants (see Figure 2).

The municipality is actively trying to make inhabitants enthusiastic about the project, nevertheless online the reactions are still negative (Tubantia, 2018). This could be caused by the fact that inhabitants are not really involved. The municipality invested millions in this project, but observing the result will not be available until the end of 2019. By means of the visuals, they show how the street will look in the future, but apparently this is not enough. Probably the inhabitants will feel more involved and therefore concerned with the Raintower project because they will directly have influence on the impact of it. This message should be clear in the online campaign.

Another example of a measure the municipality took is the Stadsbeek (1Twente, 2017). The districts Stadsveld and Pathmos are struggling with floods a lot because both are located at the bottom of the moraine (Wareco Ingenieurs, n.d). 1Twente explains that this urban stream discharges redundant water into the Tweekelerbeek after which it ends up in the Twentekanaal. Wareco Ingenieurs stated that the urban stream will contribute to the quality of life and the increase of the biodiversity.



Figure 2. Visuals of the end result Oldenzaalsestraat (Gemeente Enschede, 2018)

2.2.2 Rainproof Amsterdam

Enschede is not the only city struggling with rainwater management. A suitable example is a project executed in Amsterdam, called ‘Amsterdam Rainproof’ (Amsterdam Rainproof, n.d.). This an initiative of Waternet and the municipality of Amsterdam to inform people on how to reuse redundant rainwater and make inhabitants aware of the (preventable) damages currently made by the rainfall.

In an animation is shown how the municipality contributes to the problem and how inhabitants can help. With the use of a pragmatic hands-in-hands approach, there is tried to involve and activate all the citizens. Because the message is clearly coming from the municipality, and with all kinds of solutions the citizens should strive to, it seems slightly patronizing. This feeling should be avoided in the SRB Enschede campaign.

Amsterdam Rainproof uses a lot of bright colours and simplistic illustrations in their animation which makes rain seem as a positive thing (see Figure 3), just as the solutions which are presented as practical and easy. The colours also evoke positive emotions. This, in combination with cheerful music and at the end an encouraging story about teamwork between all the citizens and its effect, leaves the viewer with a positive, and probably motivated feeling.



Figure 3. Bright colours (Amsterdam Rainproof, n.d.)

2.2.3 Central Government

The Dutch central government takes water management problems very serious and also wants to activate inhabitants to take part in solving these issues (Ministry of Infrastructure and Water Management, 2018). Every year a Delta Programme is published by the Delta Programme Commissioner, concerning how waterboards, districts and the government handle the process of spatial adaptation. The Delta plan for 2019 contains an informative animation (Ministry of Infrastructure and Water Management, 2018).

Overall, a simplistic style is used. The voice over says that everyone needs to contribute. “From dyke worker to urban planner, from farmer to network operator, from resident to mayor.” Everyone needs to be called to action, and it seems to be more effective to get the attention of this broad group by keeping the animation simple and easily understandable. Therefore, the government made use of commonly known icons (Figure 4) and also illustrated persons as orange, blue, green (etc.) coloured human shaped forms. No group is excluded in this way, which makes every group being included at the same time.

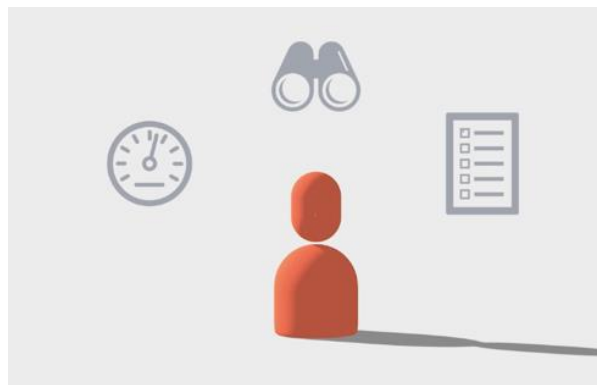


Figure 4. Icons (Ministry of Infrastructure and Water Management, 2019)



Figure 5. Humans shaped, simplistic forms (Ministry of Infrastructure and Water Management, 2019)

The government used certain techniques which could be useful for the online campaign of this project. In Figure 6, you can see how they use the same environment (base), but with different colours and additives (e.g. clouds) to create a clear difference in atmosphere. Grey colours are used in the

historical, somewhat dark toned colours are used in the negative futuristic scenario and bright colours are used in the best case scenario.



Figure 6. From left to right: historical scenario, futuristic scenario, best case scenario (Ministry of Infrastructure and Water Management, 2019)

2.2.4 Inhabitant Involvement

An interesting example of involving citizens with an animation is also created on behalf of the municipality of Amsterdam. The Animatiewerkplaats (2019) created this animation with the goal to involve the inhabitants in the debate about tourist taxes. Different options, combined with arguments are explained by a voice-over and data is shown with clear graphs.

The same patronizing aspect as in the Rainproof campaign returns, but the municipality clearly tries to involve the inhabitants in the decision making, which eventually will contribute to the adoption of the final solution (Creighton, 2005). The patronizing effect should be avoided, but the clear data visualization can be used in the SRB campaign. The bar graphs provide information in an accessible, understandable and attractive way.



Figure 7. Clear data visualization (Animatiewerkplaats, 2019)

2.2.5 'What's in it for me' Campaign

As stated earlier, Charizanis (2019) made an animation about the Raintower project that focuses on what is in it for the individual. Learned from this animation can be that with a storyline and a small portion of humour it is easy to keep the viewers' attention. On the other hand, using humour and a less

serious storyline could, in this case, have a negative effect on the message that is tried to be spread. Although, in the Enschede campaign, the problem statement could create a negative feeling, so then humour could be useful again.

The “What’s in it for me” campaign clearly focuses on the personal benefits. These benefits can be shortly mentioned in the Enschede campaign, but the focus needs to be on the greater good. The effect that all the inhabitants together can make.

As for the rest, much can be learned from the way Charizanis (2019) illustrated the working of the SRB’s and the meaning of the Raintower project in an accessible way. He did not use very bright colours, like for instance Rainproof Amsterdam, but did use a simplistic way of showing a complex product and solution.

2.2.6 Conclusion

The existing RWM projects initiated by the municipality illustrate the significance of the rainwater problems and its solutions. From the negative responses from citizens can be learned that they need to feel more involved. Concluded can be that the online campaign should focus on the fact that inhabitants need to take action and help the municipality. Only with their help the problem can be solved.

However Amsterdam Rainproof (n.d.) does try to involve inhabitants by showing how they can contribute, they bring their message in a way which can be interpreted as patronizing. A balance should be found between motivating citizens in the desired direction and belittle them by only telling what they should do. The Animatiewerkplaats (2019) chose to avoid the patronizing aspect for instance by asking for input from the viewer.

In the online campaigns discussed in this chapter, one aspect often returns. Bright colours are used throughout animations to attract the user but also to keep a positive atmosphere while discussing a serious message. The bright colours and simplistic illustrations also work well on social media, because it keeps people’s attention when they cross it on their timeline. It also is accessible for different target groups. Even children who do not understand the message, will be entertained by vivid animations and bright colours.

Chapter 3: Methods and Techniques

The further steps will be executed with the use of specific methods and techniques. In this chapter, the reason behind these methods and their workings are enlightened. Firstly, the method of campaigning is clarified and the reasons for choosing this method are provided.

The Creative Technology Design Process (Mader & Eggink, 2014) can be seen as a thread throughout the further process of designing the online campaign for the Raintower project.

3.1 Type of Online Campaign

According to previous research of Charizanis (2019), the most effective way of online campaigning in this case is with the use of an animation. Ainsworth (2008) defines an animation as a form of dynamic representation that displays processes that change over time. Ainsworth (2008) adds that animations are very useful in educating in a wide range of different topics. Also the many visual- and content based possibilities make an animation favourable. Charizanis (2019) enlightens that the popular value of animations contributed to the choice to use this technique as well.

The two other campaigns advertising the Raintower project will be visualized in animations too. The coherence between the three campaigns is another reason to apply this technique in the “What’s in it for Enschede”-campaign.

3.2 Creative Technology Design Process (CTDP)

This process was designed for the multidisciplinary bachelor programme Creative Technology which goal is to improve the quality of daily life with the use of existing technologies.

The CTDP is divided in four phases; Ideation, Specification, Realization and Evaluation (Mader & Eggink, 2014) (see Figure 8). The approach combines a focus on human centred design and classical engineering design principles. Those classical principles are for instance divergent, convergent and spiral models. Because of the feedback loops integrated in the process, it is made sure that throughout the process decisions and design changes are checked and, if necessary, revised.

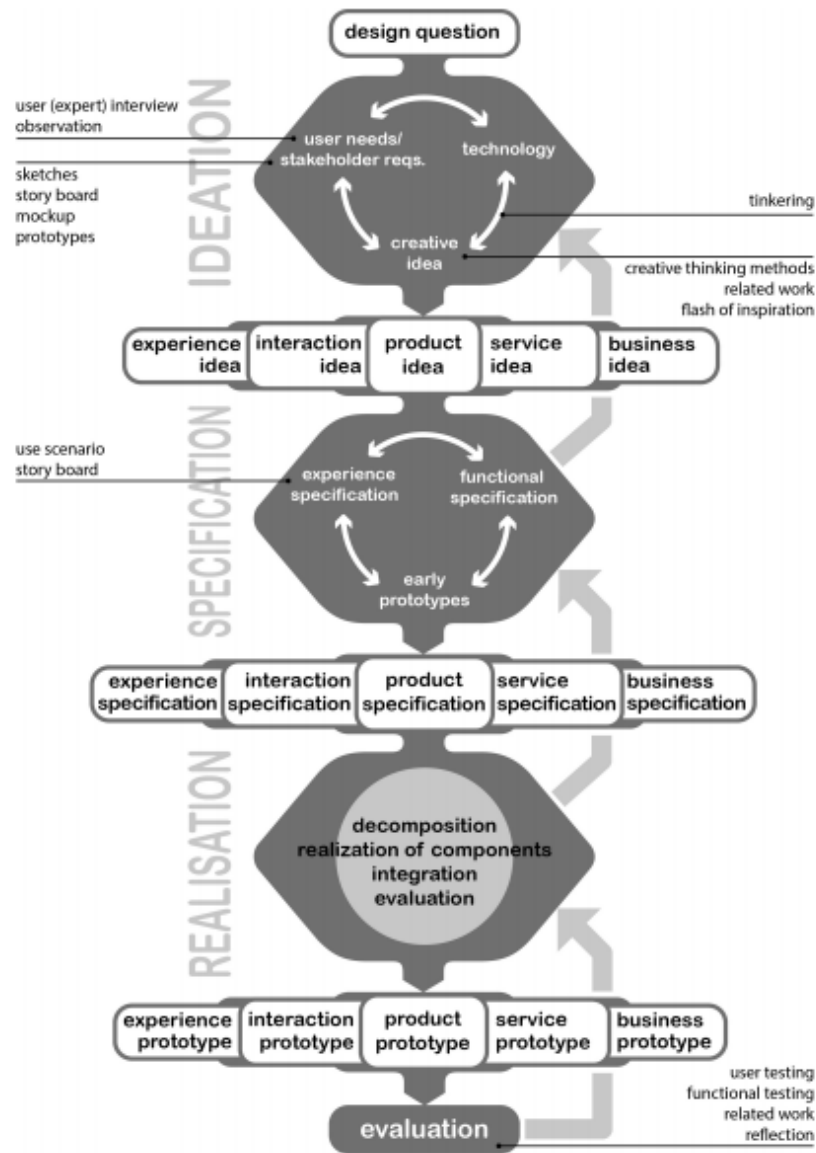


Figure 8. Creative Technology Design Process

3.3 Ideation

As can be seen in Figure 8, the process starts with the ideation phase. The project starts with for instance a creative inspiration or an order from a client. In this case the project started as a request from the University of Twente, the municipality of Enschede and waterboard Vechtstromen. Earlier projects already contributed to the SRB and the Raintower campaign, but a specific campaign answering the question “What’s in it for Enschede” was still missing.

Lateral thinking techniques can be used to enhance creativity. In this phase, inspiration is translated to more concrete ideas and problem requirements, which are further elaborated in the specification phase. Furthermore, the stakeholders are identified, analysed and interviewed.

3.3.1 Stakeholder Analysis

In the stakeholder analysis there is shown how individuals, groups and organizations influence the decision-making process (Brugha & Varvasovsky, 2000). After collecting data about the stakeholders, their interests can be represented in the further design process. In order to analyse these in a structured way, a Stakeholder Analysis Toolkit of the Manchester Metropolitan University (n.d.) will be used.

First the stakeholders will be defined and structured in a table with certain characteristics. This covers their interest in the project, what is needed from them, their perceived attitudes and the risks if they were not engaged. An example is shown in Table 1. Hereafter, they will be categorized in a stakeholder map. This map (Figure 9) shows the power-interest relations of the different parties. This is important to decide which management and communication strategies to follow with each one and see which stakeholder(s) is/are powerful and are the most crucial to gain support from.

Stakeholder	Interest in the project	What is needed from them	Perceived attitudes	Risks if they are not engaged
Stakeholder A				
Stakeholder B				
Etc.				

Table 1. Stakeholder Analysis Toolkit (Manchester Metropolitan University, n.d.)

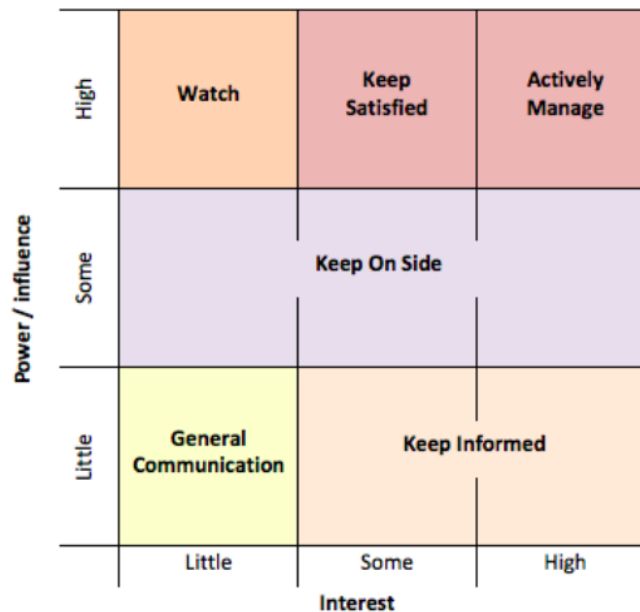


Figure 9. Stakeholder Map (Manchester Metropolitan University, n.d.)

3.3.2 Brainstorm session

A brainstorm technique was chosen to be used in a meeting with the University of Twente. This type of an idea generating technique is efficient to apply in the first stages of the product development. According to Isaksen and Gaulin (2005), it is important to keep barriers to effective brainstorming in mind. These are: the emergence of judgments during generation, members giving up on the group, and an inadequate structure of interaction.

Another student working on the “What’s in it for us”-campaign, an extra party, is also involved in this brainstorm session, which means that the last barrier is especially something to keep in mind. Therefore a clear structure is prepared beforehand. First a brainstorm takes place, where the university is not involved in. With the use of mind-maps the ideas are written down and categorized instantly. This graphical tool helps to represent, structure and analyse concepts. Afterwards, feedback is gained from supervisors representing the university. The mind-maps are being adjusted. New ideas are generated and certain ideas are eliminated. This process repeats until the visions of the parties are in line with each other.

3.3.3 Interviews

After the identification and analysis of the stakeholders, their opinions and experience can be used in the further process of the campaign development. Interviews are scheduled with representatives of the municipality of Enschede and waterboard Vechtstromen. Zorn (2010) points out that the most useful interview format for conducting qualitative research is in most cases “semi-structured”. This type of interview lies between a highly structured interview only consisting of close-ended questions and an unstructured interview in which the participants of the conversation are totally free in what to talk about.

Some broad questions and topics are planned to be discussed in the interview, but the order, additional topics and questions are not certain. Two important principles to keep in mind, according to Zorn (2010), are to avoid leading the interview or impose meanings, and to create a comfortable conversation.

Zorn (2010) also states that in order to work efficiently, it is important to provide an overview of your purpose and intended uses for the interview data. In this case it needs to be certain that both parties’ intentions and expectations are in line with each other.

3.3.4 Preliminary Requirements

In order to create guidelines for the development of the envisioned product, preliminary requirements needed to be retrieved from conversations with the stakeholders. These were retrieved from the interviews and brainstorm sessions with the main stakeholders.

The MoSCoW technique was used to prioritize the requirements. Agile Business (2017) describes that this way of categorizing the requirements efficiently deals with items of difference and similar importance. The requirements are divided in Must, Should, Could and Would sections. The requirements which the invention ‘Must have’, are the most important. Without them, the end product cannot be delivered as a viable solution to the problem, guarantee safety, considered legal, etc. When these requirements are not met, the project should be cancelled.

The ‘Should have’ requirements are important also, but not vital. The difference with the ‘Could have’ requirements is the degree of impact when they are left out (Agile Business, 2017). The ‘Would have’s’ are desirable but would be dropped first when there are problems with passing a deadline.

3.3.5 User scenario

In order to get an image of how and when the online campaign could have an impact, a possible user scenario is created. Bødker (2000) explains how a scenario provides new perspectives which changes an abstract idea into a more specific one. She adds that this scenario should not simply be a set of actions leading to the usage of the end product, but it should tell a realistic story (Bødker, 2000) which therefore contributes to the design process.

3.3.6 Concept Generation

According to the CDTP (Mader & Eggink, 2014), the outcomes of the ideation phase are creative ideas and concepts, which can still be adjusted in the specification phase. In order to keep an open view, five storylines are worked out and visualized with storyboards.

Those concepts are presented to University of Twente and with new insights and their feedback, they are adjusted in several iterations. One final concept is chosen to elaborate on further, in the specification phase.

3.4 Specification

In this phase, the product idea of the ideation phase is elaborated with the use of feedback loops. A prototype will be made in order to get a better image of how the product will look/feel/etc., and feedback is asked from stakeholders. In this case the prototype will be a storyboard presenting the different scenes in the video. After the reviewing of a prototype, it can be improved or discarded easily. Also the preliminary requirements of the ideation phase are defined in more detail.

3.4.1 Final concept

A final concept is chosen in the ideation phase to elaborate on in the further development of the online campaign. In the specification phase this concept is being defined in more detail. Firstly, the extensive storyline will be given. After having described the final storyline in details, a storyboard is drawn.

Storyboards help to look critically at the story and its sequence of scenes and visualize the imagined idea for stakeholders. Creating a storyboard should not be time consuming and will be done with pen and paper. Different scenes are visualized in a sequence of equally sized squares. Since this is not a representation of how the animation exactly will look like, drawings are simplified and not worked out yet. Text is written around the scenes to inform on what is happening exactly, or what is being said on that moment.

3.4.2 Lo-Fi prototype

The goal of a low-fidelity prototype is to present a quick, and easy adjustable representation of a concept, in order to be able to receive quick and relevant feedback. The programs that will be used in the realization phase are already used in this phase, in order to get the possibilities and workings clear.

3.4.3 Final functional- and Non-functional Requirements

Lastly, the preliminary requirements are, also with input from stakeholders, described with more detail. An animator should be able to understand the requirements instantly and should not be able to misinterpret them. Functional and non-functional requirements differ in the way they influence the system. Functional requirements are the features of the system-to-be, where the non-functional requirements define the quality of the system (Rashwan, 2012).

3.5 Realization

Mader and Eggink (2014) describe the realization phase as the one after which a final prototype can be presented. With the concept and specific requirements cleared out, the prototype can be created. This will be done with the use of several programs and methods.

As shown in Figure 8, it starts with decomposition of applications necessary for the realization. With those tools, the different components can be realized, integrated and evaluated.

3.6 Evaluation

After realizing the product idea, it needs to be evaluated. One way to bring structure to this process, is to check the earlier stated functional- and non-functional requirements on their integration in the result (Mader & Eggink, 2014). The visualization of this process is done by marking the requirements with specific colours (see Figure 10. Colour legend for requirement evaluatio).

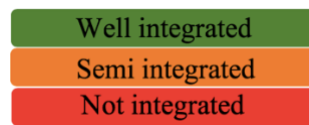


Figure 10. Colour legend for requirement evaluation

The analysis of whether a requirement is implemented or not can be done partly without other stakeholders, but at some point they are necessary to give their opinion on the way the requirements are integrated. Besides, if stakeholders are closely involved in the evaluation stage, they are more likely to support and act on the results (CDC, 2012).

3.6.1 Evaluation with Stakeholders

A meeting was planned with the relevant stakeholders represented. The time-efficient benefit in a conversation with all the stakeholders together was considered high. Additionally, this made sure all stakeholders were on one line and equally informed after the meeting.

Planned was to conversate in an open discussion leaded by a few prepared questions. It was made clear at the start, that honesty was important and useful for effective evaluation. There was room for criticism and requested improvements.

A meeting room was used with a big TV-screen available in order to show the result in a proper way. No details could be missed. The video was played once in full length. Then it was repeated but paused every scene to discuss it.

Chapter 4: Ideation

This chapter covers the process from a design question to creative product ideas. Firstly, the stakeholders are identified, interviewed, and their interests in the project are categorized. From the interviews, requirements can be retrieved in order to create outlines for the product idea. With these requirements specified, the first concepts are created and drawn in storyboards.

4.1 Stakeholder analysis

Four parties who have an interest in the “What’s in it for Enschede”-campaign for the Raintower project, will be defined and categorized in this chapter. These are the municipality of Enschede, waterboard Vechtstromen, inhabitants of Enschede and the University of Twente.

4.1.1 *Municipality of Enschede*

The municipality of Enschede is closely involved in the project. In the online campaign, the municipality will be represented clearly, so it is important to stay on the same page with this stakeholder. The reason Enschede participates is the fact that the city struggles a lot with rainwater management. With the Raintower project, they want to create awareness and involve the inhabitants. They also are financially closely involved. They for instance will finance the smart components of the first few SRB’s being sold to early adopters. Hendrik-Jan Teekens and Nicolette Hoogeveen took the role of contact persons. They respectively work with water management projects and other sustainability projects in and around Enschede.

4.1.2 *Water Board Vechtstromen*

Vechtstromen also sees the raise of public awareness about the rainwater management problems as her goals. Together with the municipality they already organize for instance ‘water days’ where water related topics are discussed and explained. By sponsoring financially and with knowledge, they support the Raintower project in order to increase this awareness and eventually get rid of the floods. The main contact person is Jeroen Buitenweg.

4.1.3 *Inhabitants of Enschede*

The inhabitants of Enschede will be the final users of the SRB’s and will be personally involved in the Raintower project in the future. The interest of most inhabitants is high, because they are negatively influenced by floods. Their houses could get damaged, the infrastructure will lay down, etc. A goal is to make the inhabitants aware of the problems and the Raintower solution, this will show them the interest they have. Inhabitants could be questioned in order to get an image of the most effective way

of approaching them. In this stage, there will be focused especially on inhabitants who already plan on buying a rain barrel.

4.1.4 University of Twente

The SRB was an initiative of this stakeholder. Richard Bults and Kasia Zalewska observe and counsel on this project. In feedback sessions, they make sure the online campaign stays in line with the main message of the Raintower project and the other stakeholders and therefore made the first contact with the municipality and Vechtstromen. They also played this role with the “What’s in it for me”- and “What’s in it for us”-campaign.

4.1.5 Stakeholder Categorization

After identifying the stakeholders, they need to be analysed in a structured way to make their role more clear and therefore use them more efficiently in the further development. The Stakeholder Analysis Toolkit of the Manchester Metropolitan University (n.d.) is used to do this (see Table 2). In Figure 11, the stakeholders are categorized in a power/interest map.

Stakeholder	Interest in the project	What is needed from them	Perceived attitudes	Risks if they are not engaged
Municipality of Enschede	More involvement and awareness of inhabitants, less strain on the sewerage system.	Expertise in projects involving and activating inhabitants. And campaign preliminary requirements. Also information is needed about their financial aid for the early adopters.	Willing to share knowledge, and open to new ideas.	Wrong message could be spread out of their name, or ineffective way of campaigning.
University of Twente	Success of the Raintower project and success of the research.	Feedback on research, methods, etc.	Close involvement in giving feedback and direction.	Not in line with the other Raintower ideas and campaigns, or University requirements.

Water Board Vechtstromen	Raise awareness about the increasing RWM problems and eventually less strain on the sewerage system.	Knowledge about existing RWM solutions.		Time waste or lack on research to other water related projects.
Inhabitants of Enschede	Less damage or other difficulties caused by floods. It is also in their interest to make the city more green for aesthetical and functional benefits.	They need to be observed in order to adjust the campaign in the most effective way.		A campaign could be created that does not have an impact on the behaviour of the inhabitants.

Table 2. Stakeholders structured (Manchester Metropolitan University (n.d.))

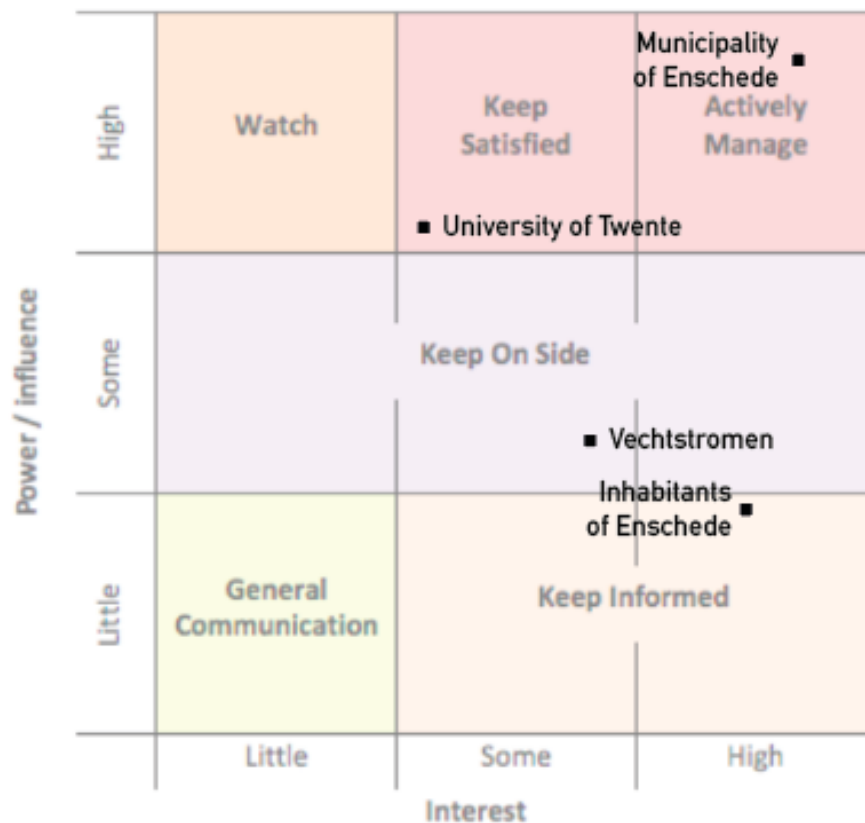


Figure 11. Stakeholders categorized in a stakeholder map

4.2 Preliminary Requirements

After the clarification of the stakeholders, their interest and their contributions, they need to be questioned about what they think should be included in the end product. These wishes are translated into a list of preliminary requirements, which need to be kept in mind during the rest of the development process.

4.2.1 Brainstorm with University of Twente

A brainstorm session was planned (24-04-19) order to get the priorities and message straight. Together with another student working on the ‘What’s in it for us?- campaign’, ideas were created about the messages and the way of spreading them. The first step was to combine the ideas in a mind map (see Figure 12).

Afterwards, these ideas and visions were discussed with supervisors (Bults & Zalewska). There was focused on the exact difference between the two campaigns. The outcome was the difference in focus of the Enschede and Us-campaign. “What’s in it for Enschede” focuses more on awareness than activation. The Us-campaign will work the other way around. Another outcome was that the relation between the information about water waste and floods should be around 1:5.

The discussion led to a new mind map which evolved only around the Enschede campaign (see Figure 13). The University of Twente aimed for a clear division in awareness and activation aspects. The specific findings can be found in Figure 12 and Figure 13. Additional mindmaps and notes from this session are placed in Appendix A

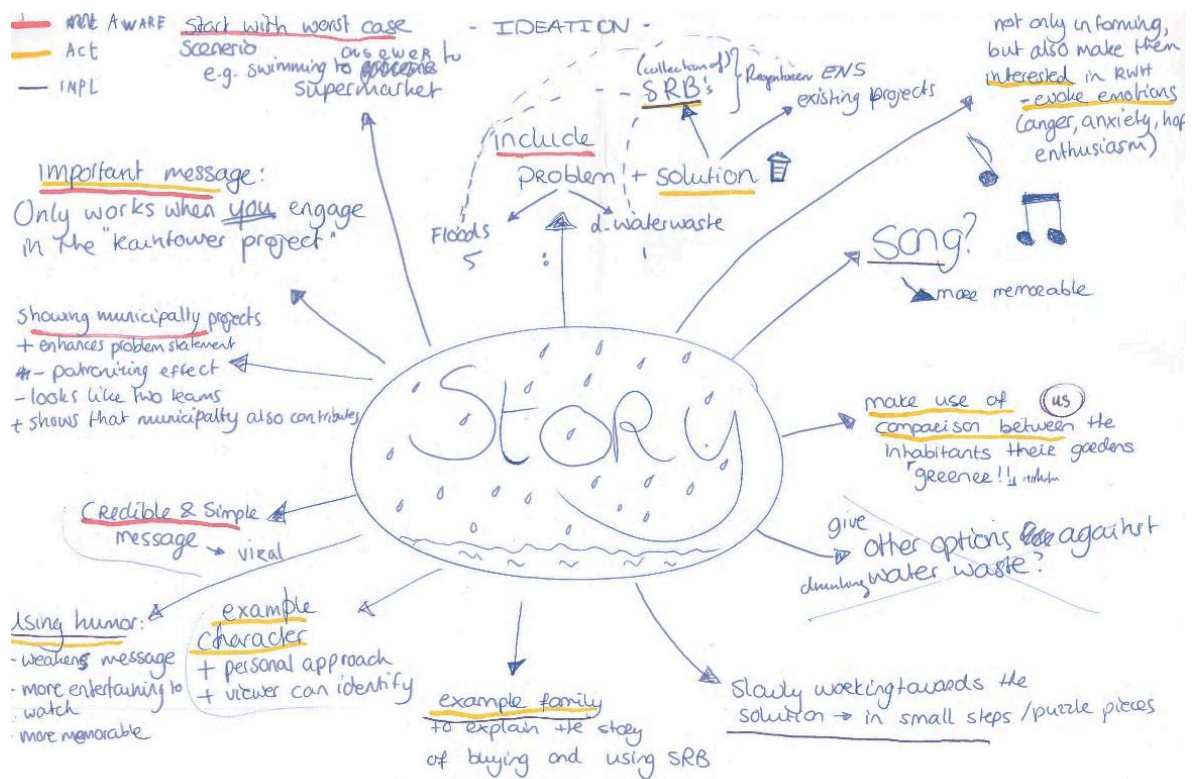


Figure 12. Mind map before brainstorming with the University of Twente



Figure 13. Mind map focusing on the 'What's in it for Enschede' campaign

4.2.2 Interview Municipality of Enschede

An interview was planned with the municipality of Enschede (02-05-19). The representative of this stakeholder was Nicolette Hoogeveen, a policy consultant in the waste and biodiversity field. A semi-structured interview was arranged in order to get feedback on ideas and ask questions to make use of her experience. The prepared questions and topics are listed in Appendix A-2: Semi-structured Interview topics (Municipality of Enschede)

Some topics were planned to be discussed (see) in order to make sure the interview would be effective. One of those topics was the role of the municipality as a stakeholder. To what extent they want to be represented in the video and what message they want to spread. Hoogeveen explained that it is important to realize that the municipality only has power over 30% of the ground in Enschede, the rest is managed by inhabitants themselves. They need the involvement of inhabitants to make a difference.

Her experience is that people usually will not take initiative if they do not clearly personally benefit from the action. The Raintower project does bring advantages for everyone, but in an indirect way. This is why she thinks that the threshold to contribute should be- and appear to be low. This can be achieved by for instance showing that the municipality will sponsor the smart part of the first SRB's. Also she thinks it is better to focus on people who have a basic rain barrel, or at least planning to buy one.

In order to call people to action, Hoogeveen states it is important to make people aware of the increase of these kind of rain showers in the future. Additionally, the similar caused problem with heat stress can be explained too, because people will recognize this problem.

Some technical requirements Hoogeveen added were that the language needs to be Dutch, with English subtitles, the logos of the stakeholders need to be clearly visible and that the video should be not too long.

Another interview (13-05-19) with a representative of the municipality was scheduled with a student (Marije Teekens), researching a way to change the behaviour of inhabitants and motivate them to implement more green areas and factors in their gardens. An important point she learned from her research, was that certain people will surely not be interested in this stage. They do not realise the significance of the problem and its possible consequences in their future daily lives. Teekens shared her experience which learned that those people only want to participate if they have a clear personal benefit. Possibly they can be influenced in the future, when their social contacts also adopt this solution, but they should not be focused on in this stage of campaigning.

Teekens stated that many miss the responsible feeling for making the city more green and rainwater proof. This could be improved by showing that they can make a difference individually, according to her.

4.2.3 Interview Waterboard Vechtstromen

Another semi-structured interview was held with Jeroen Buitenweg (22-05-19), a representative of Vechtstromen. An important aspect of this conversation was to make the contribution and impact of the waterboard in this project clear. The prepared questions and topics are listed in Appendix A-3: Semi-structured Interview topics (Waterboard Vechtstromen)

Buitenweg explained that he sees the participation of Vechtstromen as follows: When making solutions for the RWM problems you can look into different levels. First the individual houses, then within a neighbourhood, then the city (the municipality operates in this level), and the waterboard operates one level higher. Vechtstromen does not initiate projects like the Oldenzaalsestraat, but they consult municipality in the region and are able to financially support projects, if they see potential. He emphasized that close collaboration with the municipality is crucial.

Geographical lower areas in Enschede suffer heavy rain showers take place because they cause peaks in the amount of water in the city's sewerage system. Buitenweg described that they want to reduce those peaks. This is nowadays achieved by creating more space to buffer water (e.g. wadi's, Stadsbeek). The crucial difference the Raintower project makes, is the fact that the SRB's create space to buffer water before a rain shower comes up, according to Buitenweg.

4.3 Preliminary requirements

Based on the background research, state of the art and interviews with the University of Twente, municipality of Enschede and waterboard Vechtstromen, preliminary requirements were listed. The MoSCoW technique, explained in Chapter 3 was used to categorize these requirements.

MoSCoW Requirement

Must	
	<ul style="list-style-type: none">- Show the RWM problems in Enschede- Show the existing RWM solutions provided by the municipality- Show the involvement of University of Twente, waterboard Vechtstromen and municipality of Enschede- Show the relevance of the Raintower project- Address people who are already interested in buying a normal rain barrel- Dutch language, English subtitles- Be an Animation- Visualize rain as something positive (in the end)- Show recognizable logos of the three stakeholders- Have a length below 3 minutes- Add Raintower logo

Should	<ul style="list-style-type: none"> - Evoke activating emotions - Make inhabitants aware of the climate change and its consequences in Enschede - Show the threshold is low to contribute - Not focus too much on drinking water waste problems - Include heat stress - Use a clear, bright animation style
Could	<ul style="list-style-type: none"> - Include comparison of different households - Zoom in to specific, common known spots - Include an interactive action - Contain humour - Contain a personal storyline
Would	<ul style="list-style-type: none"> - Expand the campaign to other cities

Table 3. Non-functional preliminary requirements

4.4 Scenario

In order to get an image of how the online campaign will be used and to know on who to focus, a possible scenario in which the video will play a role is being created.

4.1.1 Sarah

Sarah is 36 years old, lives in Enschede for 3 years now and enjoys time she spends with her family the most. She has two young children who love to play outside. She and her husband bought their own house in the neighbourhood Eschmarke and wanted to have their backyard tiled, so they did not have to worry about gardening.

Spring is coming and Sarah cannot wait for the weather to allow the children to play outside the whole day and for her to read her new book in the relaxing garden chair. However, this ideal image, unfortunately does not match reality. A few days in a row Enschede suffers from heavy rain showers. One morning Sarah wants to prepare breakfast, she finds out rainwater is slowly streaming on the kitchen floor. At this moment she also notices the garden, turned into a water pool of a few centimetres.

Even though her children love their new pool and entertain themselves the whole day with their rainboots on, Sarah and her husband are worried about the damage which will cost them a lot. The whole street suffers from the problem and all the contractors need to work with a waiting list because of the many requests. When finally a contractor comes to fix the damage, he advises to get rid

of the tiles in the backyard and purchase a rain barrel, because these kind of rain showers will occur more often in the future.

Sarah starts to read and learn about the rainwater management problems, its causes and its consequences. While scrolling on Facebook to see how her friends acted on the rain showers and decreased the damage, she encounters a video from the municipality concerning this problem. Curious about what they have to say, she watches the video. It becomes clear that not only the municipality can do something about this, she can also contribute by buying a rain barrel and make it smart. Her husband is very into new technologies and gets enthusiastic too. They decide to get involved in the Raintower project and buy an SRB. Additionally they plan to make their garden more green before the summer starts.

4.4 Preliminary Concepts

Different ideas were scaled down to preliminary storyline concepts for the animation. Five different storylines were created. After discussing these with the University of Twente as a stakeholder, the concepts were adjusted, eliminated or even combined. This process repeated itself until four concepts came out. Iteration is, according to the CDTP (Mader & Eggink, 2014) an important part during the development stages. To get more insight in how the animation would look like and to make it more clear for stakeholders, the concepts were drawn schematically in storyboards.

4.4.1 Concept 1: “Time Travel”

Rain is shown as something negative. Grey clouds, people running with umbrellas, etc. “*In Enschede this is not an unusual image*”. It is shown how the streets get flooded and houses damaged. Also the heat stress and drought is shown when it is not raining. Existing projects fighting the RWM problems are shown, but afterwards is made clear that this is not enough.

The camera moves out and shows a public watching the video and peoples thoughts. “Hmm that sounds bad, but I can’t make a difference on my own”, “I don’t care, it only floods a few times a year”, etc. They show passive behaviour.

A jump in time is made to 2025. Someone from the public is floating in a rubber boat with his children to his house on pillars. He over thinks his first impression of the video he saw six years ago. Maybe he should’ve listened...

A jump is made back in time. “Luckily it is not too late yet!” The Raintower solution is explained. Colours become brighter. Rain is now shown as something positive and productive. See A-2: Semi-structured Interview topics (Municipality of Enschede)

Interview topics municipality of Enschede: Nicolette Hoogeveen

Language: Dutch

General questions:

- What are your opinions about the “What’s in it for me?” campaign?
 - What were positive aspects?
 - What could be changed in this campaign?
 - What do you think of the style of the campaigning video?
- What is the required length of the animation video? Should the video consists of certain colours or do you prefer a certain style?
- Are there examples of other campaigning videos available, where the campaign is also communicated towards the inhabitants of Enschede?

Specific questions “What’s in it for Enschede?” campaign:

- To what extent would you like to see the municipality of Enschede represented in the campaigning video?
- The ideas for the “What’s in it for Enschede?”-campaign tend to very educational ones with no personal attaching stories involved. What do you think about this evolution?
- What do you think about showing the Oldenzaalsestraat (sewerage system and wadi’s) and the Roombeek as only existing RWM-projects?
- Do you think there is another way to involve inhabitants in the problem solving? From literature I retrieved that civil participation only works when they are involved from the beginning. Is there another option to let them contribute actively in another way?

Specific questions “What’s in it for us?” campaign:

- Do you think the target group should focus on people living on top of the moraine or the people living in the lower areas of the city?
- Are there any trends in certain neighbourhoods in terms of solar panels for example? Do people follow up on each other in this type of trends?
- Out of literature research there can be concluded that social pressure influences behaviour. Do you see this social pressure factor neighbourhoods?
- What is according to you the best way to activate the inhabitants of Enschede? Should the message consist of certain emotions, such as anger, anxiety and awe?

A-3: Semi-structured Interview topics (Waterboard Vechtstromen)

Interview waterboard Vechtstromen: Jeroen Buitenweg

General questions:

- What is exactly the contribution of the waterboard Vechtstromen to the ‘Raintower’ project, why are they contributing?
- What are your opinions about the “What’s in it for me?” campaign?
 - What in this campaign was done well?
 - What could be changed in this campaign?
 - What do you think of the style of the campaigning video?
- What is the waterboard Vechtstromen currently doing to lower the pressure on the sewerage system? Are there any solutions?
- Which neighbourhood or group would you pick as a target group? Potential rainwater buffer buyers?

Specific questions storyboard “What’s in it for Enschede?” campaign:

- Is it clear what message the waterboard Vechtstromen is telling you in this storyboard?

Specific questions storyboard “What’s in it for us?” campaign:

- Is the story and message of this storyboard clear?
- Is it according to you necessary to show more about the pressure on the sewerage system? Or is this irrelevant in this campaign?

Appendix B: Ideation Concepts for the storyboard.

4.4.2 Concept 2: “Only moving forward”

In this idea, the three aspects of the animation (problem statement, existing projects and Raintower solution) are divided over the main stakeholders. The camera will start moving to the right and this will continue in the whole video (except for the first and last scene).

The RWM problems will first be shown from the municipality’s perspective. A representative of the municipality (simplistic illustrated) walks and passes by the RWM problem causes and consequences. Then, a representative of Vechtstromen walks in the screen and joins him. He shows the strain on the sewer system. The Vechtstromen representative stays with the sewer system, but the screen keeps moving so the municipality representative walks alone again. He shows the Oldenzaalsestraat and Stadsbeek and briefly explains them. He says this is not enough and the water level slowly rises under his feet. With a rubber boat he floats to the University of Twente, for a solution.

A representative of the UT then walks with the Municipality character and he shows the SRB and explains its working. Vechtstromen joins again and the three stakeholders point at a network of SRB’s working as a water tower. In the last scene, all the solutions are shown again on one side of the screen. The SRB is attached to a house which still is transparent and with an inhabitant who is not identified. This illustrates the viewer who will notice that he is needed to complete this story. See Appendix B-2: Storyboard “Only moving forward” for the storyboard.

4.4.3 Concept 3: “The missing piece is YOU”

An interactive video. The viewer is illustrated by a person/super hero and is asked who she would ask to help her save Enschede from the floods. She can choose between the municipality, Vechtstromen and the University.

When she chooses the municipality, the character walks into the City Hall. Someone shows her how the municipality already is fighting the floods by showing existing projects. It is not enough, because they don’t own all the territory in Enschede, but it is a part of the solution. The viewer therefore gets one puzzle piece.

She is directed back to the start screen and can choose another organization to help him. When she chooses Vechtstromen, she gets educated about the climate change and the increasing strain on the sewer system. She gets a second puzzle piece.

Then she can choose for the University of Twente, where the Raintower solution is explained. The future network is shown, and all kinds of SRB’s (different aesthetics but also sizes). They tell her that the SRB is done, but needs to be adopted by more inhabitants to do its work properly, so the SRB alone is not enough. That is why only a puzzle piece can be collected again.

The puzzle can be created, but there still misses one piece. This empty space has the form of a person and represents the viewer. He is the only missing piece in the solution for the floods. See Appendix B-3: Storyboard “The missing piece is YOU”

4.4.4 Concept 4 “Meet Ton, the SRB”

To make it more playful, the story could be told by a living SRB itself. ‘Ton’ introduces himself as a normal rain barrel. It starts raining, so it is filled slowly with rainwater. When he is fully filled, he starts getting worried and shows the viewer the consequences of this much rainwater (floods). He calls the municipality to ask for a solution. They give him information about the existing projects but also that they do not own most of the territory in Enschede, so they don’t have power over those other places. Ton wants those people to come to action too, so goes to the University of Twente to ask for a solution. They make him smart (a professor explains what he has added to make him smart).

Ton shows his other SRB friends and what they can accomplish together. At the end he only needs somewhere to live, so he asks the viewer to take him in. See Appendix B-4: Storyboard “Meet Ton, the SRB” for the storyboard.

4.4.5 Evaluation

After considering all concepts, one concept needed to be chosen for further development. After evaluation with the University of Twente, the following decisions were made.

Concept 4 (living SRB) was appreciated because of its humour and accessibility, but would not be serious enough for adults. The idea could be used in the future when a campaign has to be made for children. The interactive idea was another favourite, but did not end up as the final choice because it requires interest and actions from the viewer. The campaign should be accessible for everyone, so also for people who don't want to interact with a video and need to pay attention to what they click on. Although, this idea could be applicable on the final campaign. The user could choose which campaign (Me, Us or Ens) he wants to look at first, or at all.

Finally concept 2 was chosen because of the clear participation of the three stakeholders and in the end the inhabitants themselves. This is why this concept is further elaborated in the specification stage.

Chapter 5: Specification

In this chapter, the final concept is elaborated. Firstly, the storyline is described in more detail and drawn in an elaborative storyboard. Hereafter, the first exploratory animations and illustrations are made serving as a Lo-Fi prototype. Secondly the preliminary requirements of the ideation phase are being specified into non-functional and functional specification requirements.

5.1 Final storyline

After choosing the final concept, this concept needs to be specified. Only if the storyline is defined in details, stakeholders can give feedback and effective iterations can take place. In the next paragraphs, the different scenes are described.

5.1.1 Introduction

The skyline of Enschede is being drawn on the screen. The most characteristic buildings of the city are displayed with various bright colours. A representative of the municipality of Enschede comes in and stops to introduce himself. A voice over talks during the whole video from the perspective of the municipality. The character is provided with the logo of Enschede on his clothes, to let the viewer remember during the video he is a representative of the municipality. He starts with describing how beautiful Enschede is and that the municipality tries hard to keep it this way. He starts to walk to the right, which he will be doing for the rest of the video. This movement stands for the forward movement, action and thoughts about the future, the video needs to initiate by inhabitants.

5.1.2 Rainwater management problems

The character adds that keeping Enschede beautiful and viable is becoming harder and harder because of the climate change which contributes to the increase of rainwater management problems. During his explanation, the climate change and its consequences are being illustrated in a simplistic way.

A representative of Vechtstromen joins the representative of the municipality and they stop for a second to show them next to each other. Vechtstromen also wears clothes with a characteristic colour and the Vechtstromen logo. They start walking forward again and explain that both parties work on this problem already. They explain why lower areas of Enschede suffer from the floods and what effect this has on the sewerage system.

5.1.3 Existing projects

The both representatives walk further and show the viewer two existing projects in Enschede, starting with the Oldenzaalsestraat. The Oldenzaalsestraat is illustrated with the pipes underneath- and wadi's next to the road. The wadi's and pipes fill with water and explained is that in the future the

Oldenzaalsestraat will be able to buffer 7 million litres of water. The second project is an urban stream, the Roombeek. Illustrated together with a recognizable building located in that neighbourhood.

5.1.4 Smart Rainwater Buffer

At this moment in the video it starts to be clear that the viewer needs to come to action. Those existing projects are not enough to solve the rainwater management problems. This is why the municipality- and Vechtstromen representative walk to the University of Twente, where a representative of this institution is already waiting for them. The three of them walk further and the SRB is presented. The way it works is explained by showing water being buffered and being released when the SRB knows it will rain. Additionally there is shown that the buffered water can be used for, for instance, gardening.

5.1.5 Raintower Project

As the three stakeholders walk further, a network of SRB's is being drawn. Also two inhabitants of Enschede appear in the screen. The two inhabitants are seated on a bench. This stands for the fact that they still need to come in action, while the three stakeholders are already moving forward the whole time. The three representatives stop walking and the Raintower project is explained to the two inhabitants. The lines connecting the SRB's in the network change into a water tower and the similarities of the two are explained. Shown is how a water tower buffers water for a city in times of heavy rainfall, and provides water during drought. The inhabitants slowly stand up from their bench, which represent the idea they come in action.

5.1.6 Ending

A market stall is being drawn with the skyline of Enschede in the background. The representative of the municipality is stalled behind the booth. The representatives of Vechtstromen and the University and the two inhabitants walk with a normal rainwater buffer towards the booth. When they reach it, their rainwater buffer is made smart by the municipality. The voice over points out that you only need to buy a rain barrel, the municipality will help to make it smart. And ends with the message that only if we work together, Enschede can stay liveable.

5.2 Storyboard

The final storyline is visualized in a storyboard. The combination of a detailed storyline with matching drawings gives a better image of the final end product. See Appendix C: Final Storyboard for the final storyboard.

5.3 Lo-Fi Prototype

With the chosen storyline being clear and worked out in detail, the first illustrations were made. While gaining more knowledge about the used programs and receiving feedback from stakeholders, those first illustrations were adjusted a lot. In this stage iteration happens fast and around every detail. Certain illustrations from the Lo-Fi prototyping stage are described and the choice of changing them is explained.

5.3.1 Characters

There was chosen for a style which looks like it is being drawn by hand with a pencil. For instance see figure 14, representing the municipality character. It was practical to quickly sketch a character and use this in the first versions of the animation. This was a first try-out, but later was decided to make the characters more simple because of knowledge about possibilities with the animation program.

Because it not certainly would be the style used in the further process, a walk-cycle was not yet animated. Animating a walk-cycle is time-consuming and was therefore only done with the final character.

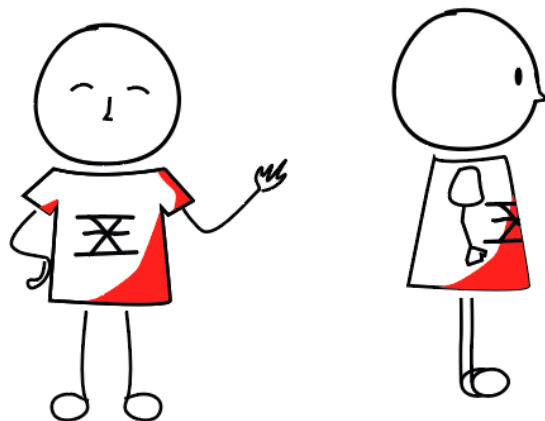


figure 14. Character representing the municipality (first iteration)

5.3.2 Skyline

In Figure 15, the sketched skyline of Enschede is presented. This image is a still from the first scene. With the use of evaluation techniques and received feedback from stakeholders, the skyline was adjusted in later stages to make it more recognizable as the city Enschede. Even though the skyline was not complete in this stage yet, the style was clear enough to get relevant feedback on.

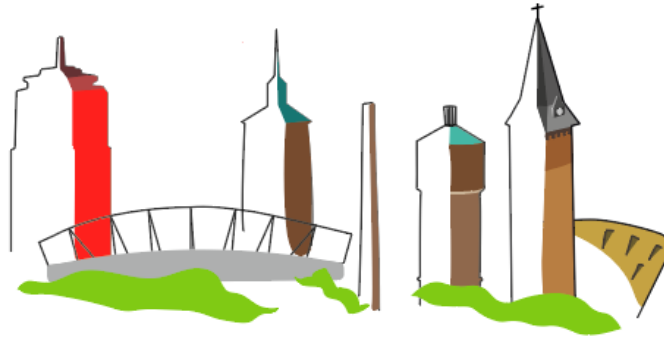


Figure 15. Skyline of Enschede (first iteration)

5.3.3 Existing Projects

When the municipality shows how they are already trying to solve the rainwater management problems, the project of the Oldenzaalsestraat is given as the first example. The voice over explains the project in two parts. First the pipes under the ground, then the wadi's. Therefore, in the first iteration the visualization of this project also existed of two parts (see Figure 16). During a feedback session with the University of Twente, concluded was that this was not recognizable enough. Someone who has never heard from this project will possibly not be able to imagine how the two parts are located, compared to each other.

The other presented project of the municipality is an urban stream. In the beginning, there was chosen for a simplistic visualization of an urban stream which could be located everywhere in the city (see Figure 17). For the same reasons concerning recognizability, in a later stage there was chosen to search for a well-known urban stream as the Roombeek. The Stadshaard, which is a famous building located this neighbourhood, was added too.

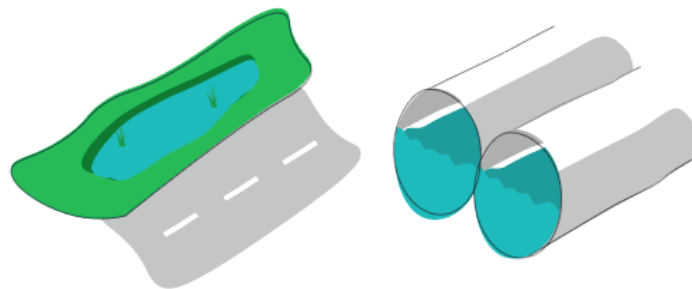


Figure 16. Wadi and pipes of the Oldenzaalsestraat project (first iteration)

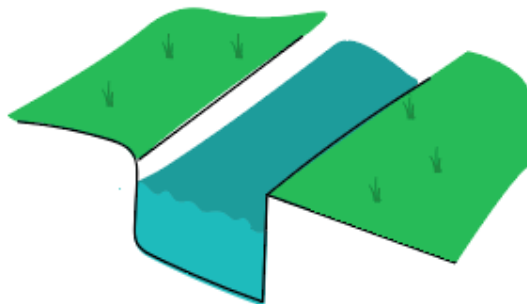


Figure 17. Urban stream (first iteration)

5.4 Final Requirements

The MoSCoW technique is used again to turn the preliminary requirements of the ideation phase into more specific, final ones (see Table 4 and Table 5). One table representing the functional requirements concerning what the system should do and one with non-functional requirements about how the system should do this. From this categorized list, an animator should be able to create an acceptable video with no misinterpretations about for instance the message, or colours used.

5.3.1 Non-functional requirements

MoSCoW Requirement

Must	<ul style="list-style-type: none"> - Make clear that the municipality of Enschede is already trying to solve the RWM problems, but that this is not enough - Show the relevance of the Raintower project by showing the effect of a network of SRB'S - Activate an inhabitant by explaining she is necessary for the project to work - Address people who are already interested in buying a normal rain barrel
Should	<ul style="list-style-type: none"> - Evoke activating emotions: In the beginning negative activating emotions as anxiety and anger (with showing problems), in the end positive emotions as hope and enthusiasm (with showing the Raintower solution) - Make inhabitants aware of the climate change and its consequences in Enschede by explaining how the climate change is increased these days and what consequences it has on the amount of local rainfall. - Show the threshold is low to contribute by explaining the project in a simple way - Not focus too much on drinking water waste problems. The focus needs to be on the flooding problems. The maximal relation can be around 5:1 (floods : water waste). - Use a clear, bright animation style (see for instance Rainproof Amsterdam)
Could	<ul style="list-style-type: none"> - Include comparison of different type of inhabitants - Contain entertaining aspects like humour or sound effects, to keep the attention
Would	<ul style="list-style-type: none"> - Expand the campaign to other cities which are also struggling with floods and RWM problems

Table 4. Non-functional specification requirements

5.3.2 Functional requirements

MoSCoW Requirement

Must	<ul style="list-style-type: none"> - Dutch language, English subtitles - Be an Animation - Visualize rain as something positive (in the end) - Show recognizable logos of the three stakeholders - Have a length below 3 minutes - Add Raintower logo - Show that a normal rain barrel can be made smart and that the process of making it smart can be done easily - Show the causes and consequences of RWM problems in Enschede with visualizing the strain on the sewerage system and floods in streets - Make the involvement of University of Twente, waterboard Vechtstromen and municipality of Enschede clear by letting them be represented by characters in the animation
Should	<ul style="list-style-type: none"> - Include the extra problem caused by the climate change; heat stress
Could	<ul style="list-style-type: none"> - Contain a personal storyline which follows a certain inhabitant - Visualize different type of families and show the different advantages they gain from an SRB - Zoom in to specific, common known spots as streets (e.g. de Heurne or the Getfertsingel) and show how they're affected by the floods.
Would	<ul style="list-style-type: none"> - Include an interactive action to involve the viewer in the problem-solving process by let him choose which information he wants to collect and from which stakeholder

Table 5. Functional specific requirements

Chapter 6: Realization

In this chapter, the process of selecting suitable software and the working with it is described. The visual and audio aspects of the final video are being separated and explained. Because different applications and techniques are used, the general workflow is defined and visualized in a diagram. Hereafter, the separate steps within the workflow are described in more detail.

6.1 Visual Software

In order to create a professional online campaign, proper software should be used. For the visual parts of the animation, there was chosen for a combination of two programs from the same software company to increase consistency of style, equal program features, and simple file-exchange opportunities.

6.1.1 *Adobe Illustrator CC*

While making illustrations, the graphic driven software Adobe Illustrator CC (version 23.0.1) is used. This is part of a set of applications and services, Adobe Creative Cloud, from Adobe Systems (Weber, 2013). With several options to create and infinitely resize desired shapes, it is a useful tool while designing logo's, graphics, lay-outs or in this case illustrations for animations. The animation software for this project also belongs to Adobe Creative Cloud, which gives more advantages. Adobe Illustrator files can be imported in the animation program, maintaining their full quality, and even be adjusted.

6.1.2 *Adobe After Effects*

The animation software used for the video, is Adobe After Effects (version 16.1.1), which also belongs to the Adobe Creative Cloud. This software application is used for creating motion graphics and special effects used in video, online content and presentations (Smith, 2018). The different levels of simplicity and high amount of tutorials available online makes the software accessible for designers with a wide variance in skill and experience.

In this project, the 2D-footage features will be used. One composition can be created which consists of different compositions. This clean hierarchical structure makes it easier to make global changes and keeps the file structured.

When the animation is finished, After Effects gives the option to render the file in high quality. The rendering of a movie is the frame-by-frame rendering of each of the frames that make up the movie (Adobe, n.d.).

6.2 Audio software

However visual effects play a crucial role in how a video is perceived, audio has an impact too. When used in the right way, sound-effects, voice-over and music affect emotions of the viewer (Jacobson, 2015). On-screen visuals can be brought to life.

6.2.1 iMovie

The final editing was done with iMovie (version 10.1.18) from Apple Inc. With this software for iOS and MacOS clips can be edited easily from scene to scene. However iMovie provides a lot of options concerning the visuals of a video, in this project it was mostly used for processing and acquire audio fragments, and in the end the combination of audio and visuals.

6.2.2 Microphone

The voice-over talks throughout the whole video, therefore a microphone was needed to get a pleasant quality to listen to. The built-in microphone of EarPods (Apple) was used to achieve this quality. In a soundproof room the fragments were recorded to reduce noise. The fragments were edited and categorized in iMovie.

6.2.3 iMovie sound library

One reason why there was chosen for iMovie as the final editing software, is the broad sound library it includes. Different background tunes and sound-effects are available depending on the atmosphere you want to create. These fragments can be used on a royalty free basis for personal and commercial use.

6.3 Workflow

6.3.1 Introduction

After the software being defined, the realization starts. A certain sequence of steps was iterated during the development of the animation video (see Figure 18). First a shape is illustrated in Adobe Illustrator (AI), after which it is imported in a composition in Adobe After Effects (AE). This file exchange is represented by the black arrow from AI to AE. The grey arrow pointing back to AI does not represent file exchange but feedback. In AE an illustration may appear to be not suitable, so it need to be adjusted in Illustrator and imported again.

The same holds for the exchange between AE and iMovie. Because for instance walk cycles are integrated in the video, the speed cannot simply be adjusted in iMovie (the character will all of a sudden walk slower during an amount of time). A rendered AE file is imported in iMovie and when something needs to be adjusted, it is done in AE and imported again. When something appears to be

adjusted in an illustration it will follow the same road from AI to AE to iMovie again, whereas the audio fragments are being imported and edited in iMovie.

To give an example, the stages in bringing the municipality character to life, are being shown in the workflow diagram (see Figure 19). After the figure is illustrated in AI, a walk cycle is animated in AE. In the iMovie sound library, the sound-effects of footsteps are found and a voice is recorded to let him say something. In iMovie the rendered AE file is imported and the audio fragments are placed on the right moments.

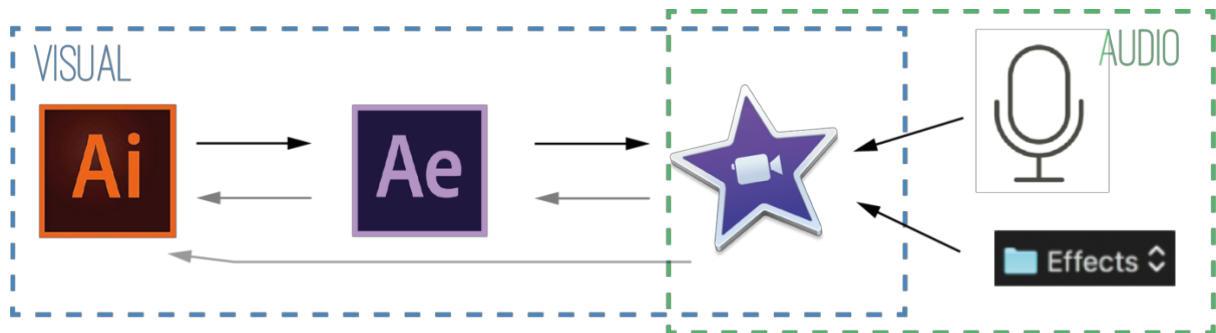


Figure 18. Workflow

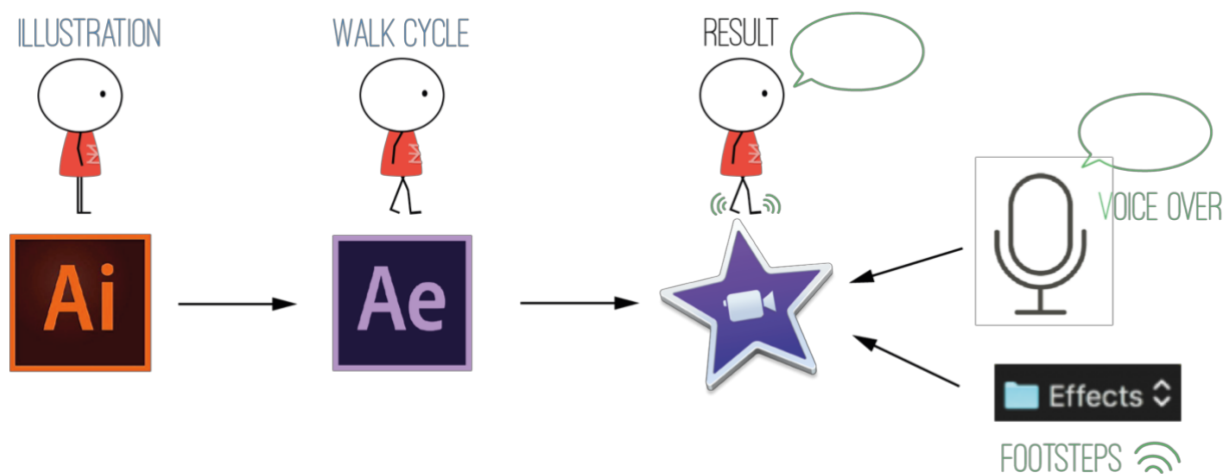


Figure 19. Bringing the municipality character to life

6.3.2 Illustration

There was chosen for a loose, somewhat messy illustration style, to make the video attractive, accessible, and easy to keep up with. It had to seem like the shapes were drawn with the hand on that exact moment while explanations were given by a voice-over. This resulted in shapes with a base of a simple black line, which enhances the feeling of the shape being drawn on white paper with a black pencil. To increase attractivity and to brighten up some serious moments, the shapes are partly filled in

with bright colours. To protect the consistency, a colour scheme, shown in Figure 20 was used as a thread while illustrating (Amelia, 2018).



Figure 20. Colour scheme "ARK" (Amelia, 2018)

6.3.3 Animation

To bring the illustrations to life, they had to be animated. To create the idea of the objects being drawn while watching the video, the Trim Paths function was used in. This function allows you to decide how much of a certain path is shown on one moment and how much on a later moment in time. Firstly, the black outline of the figure is drawn, followed by the coloured fills. This sequence contributes to the sketching illusion because it equals the natural workflow of drawing an outline and filling it in (see Figure 21).

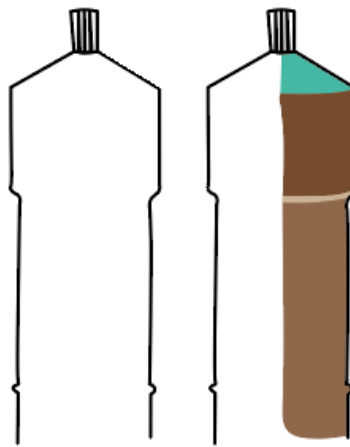


Figure 21. City Hall drawn in a natural sketching sequence

Because the characters walk to the right but are being placed at one position, the lower-left, the drawn objects need to move from right to left to create the effect of the character walking past the objects. This means that while they are being drawn, their position is also changing.

Because the video is showing a continuous flow of movement and there is no clear distinction in scenes, it was divided by topics. For instance the 'Existing Projects' topic was animated in a different composition, including the Oldenzaalsestraat and the urban stream. In this separate composition, the animations could be adjusted without influencing the rest of the animation. The different compositions were added to the main composition on the right place in the timeline.

A challenge was to let the characters walk naturally. The forward movement and its deeper meaning is a substantial part of the video and needed to be properly visualized. According to Sanders (2019) a walk-cycle can be animated in 8 keyframes as demonstrated in the Preston Blair cycle (Figure 22). This cycle was animated in a separate composition and later implemented in the main composition where the software gives the opportunity to loop the animation throughout the video with the scripted *LoopOut(Cycle)* function.



Figure 22. Preston Blair walk-cycle in 8 keyframes

6.3.4 Audio

In order to record the voice over efficiently, a script was written out (see Appendix D: Script) which suited the different scenes. This voice over gives explanation about what is being illustrated at the same time.

Because of the sufficient quality of the recorded fragments, they did not needed to be edited a lot in iMovie. The background noise was reduced a little to make them sound more clean. Additionally fade in and -outs were adjusted to make the whole sound more fluently, and to scrap out the sound of starting and ending a recording.

There was chosen for light, neutral background music called ‘Slinguruurwerk’, out of the possibilities iMovie provided. This tune slightly changes in volume when the voice-over is talking to stir the viewers’ attention back to the core of the video.

Several sound effects are used to strengthen the visualized effects. Throughout the whole video, shapes are being drawn. This movement is made more realistic with the sound of a pencil sketching on paper. Furthermore, rain showers and other ‘actions’ including water are given more meaning with sounds. Water is an important aspect of the video and should stand out. Also technological details are enforced by sound. For instance when the SRB signals a rain shower, or where the municipality makes SRB’s smart.

Overall, these sound effects are mostly perceived unconsciously by the viewer but nevertheless influence the experience crucially.

6.4 Conclusion

Having followed the workflow visualized in Figure 18, the realization phase was executed smoothly. However, in the beginning there were made mistakes in how to save certain scenes which made that

they could not be adjusted easily, without affecting other scenes. Later on, while working with the programs full-time, a more efficient way of working was developed and the process got accelerated. Concluded can be that in order to work in a structured way, different scenes need to be sketched in different compositions.

The illustration- and animation style together, created the illusion of the figures to be drawn by hand on the spot. This illusion in combination with the bright colours, contributed to a playful, positive atmosphere, while discussing relatively serious topics. A number of scenes from the result are displayed in Figure 23.

The amount of time needed for the realization was underestimated in the beginning, but further in the process, more realistic time estimations could be made. This resulted in better substantiated decisions about setting priorities.

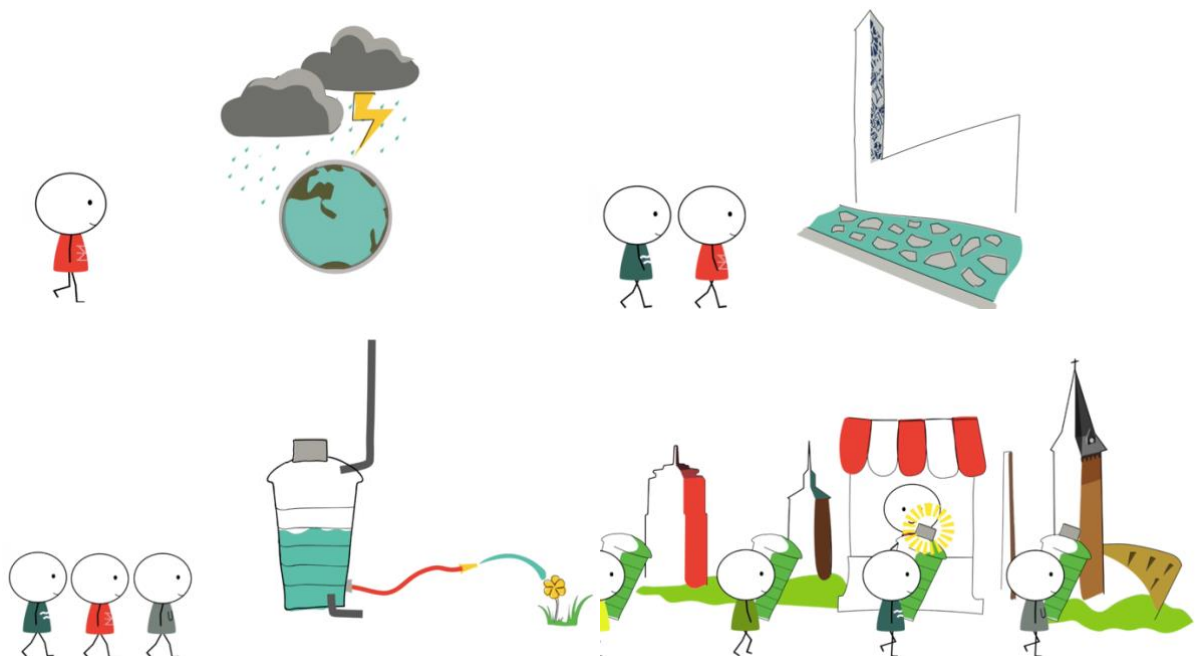


Figure 23. Stills from the end result

Chapter 7: Evaluation

In this chapter, the evaluation of the result created in the realization stage will be described. Firstly, interesting and crucial comments from an evaluation session with the stakeholders are described and discussed. Hereafter, the functional- and non-functional requirements are checked and evaluated on their integration in the video, partly with help of the evaluation session with the stakeholders.

7.1 Stakeholder Meeting

With representatives of waterboard Vechtstromen, the municipality of Enschede and the University of Twente, the animation video was evaluated. The first reaction of the stakeholders was very positive. They considered the video very suitable as a part of the Raintower campaign.

For instance the way the skyline is illustrated was appreciated. The fact that the black lines could represent every city, but the colours make it Enschede works very triggering according to the representative of Vechtstromen. However, it turned out that the skyline could be made more recognizable by for instance adjust certain buildings.

During the evaluation session, a new discussion started. First of all, the municipality was very pleased by the visualization of their role in the ending scene where the municipality character. However, an important aspect could be added. Right now, only two inhabitants bring a rain barrel which is made smart by the municipality. The campaign should bring a whole population to action so this should also be presented in the video. The discussion led to two new aspects which can be added in the future. One is more inhabitants making their barrel smart, which is a simple addition. The second requested addition has more impact. The link between- or combined effect of the existing projects, which are being referred to earlier in the video, and the Raintower solution is not yet shown or described. This should be visualized in a whole new scene which will play after the current ending scene. The message of this extra scene should be that the effect of the SRB's and the existing projects could be equal in the future. A map of Enschede could be shown, including some projects on their real location, with SRB's appearing everywhere.

7.2 Non-functional Requirements Evaluation

Table 6. Evaluation of non-functional requirements represents the non-functional requirements after being checked on implementation. First of all, the 'Must' requirements were checked, because if they are not implemented, the product cannot be used for the desired purposes. Hereafter, the 'Could', 'Should' and 'Would' requirements were checked.

Since the 'Would' - requirement could not be ticked because of time issues, it is not covered in this part.

MoSCoW Requirement

Must	<ul style="list-style-type: none">- Make clear that the municipality of Enschede is already trying to solve the RWM problems, but that this is not enough- Show the relevance of the Raintower project by showing the effect of a network of SRB'S- Activate an inhabitant by explaining she is necessary for the project to work- Address people who are already interested in buying a normal rain barrel
Should	<ul style="list-style-type: none">- Evoke activating emotions: In the beginning negative activating emotions as anxiety and anger (with showing problems), in the end positive emotions as hope and enthusiasm (with showing the Raintower solution)- Make inhabitants aware of the climate change and its consequences in Enschede by explaining how the climate change is increased these days and what consequences it has on the amount of local rainfall- Show the threshold is low to contribute by explaining the project in a simple way- Not focus too much on drinking water waste problems. The focus needs to be on the flooding problems. The maximal relation can be around 5:1 (floods : water waste)- Use a clear, bright animation style (see for instance Rainproof Amsterdam)
Could	<ul style="list-style-type: none">- Include comparison of different type of inhabitants- Contain entertaining aspects like humour or sound effects, to keep the attention
Would	<ul style="list-style-type: none">- Expand the campaign to other cities which are also struggling with floods and RWM problems

Table 6. Evaluation of non-functional requirements

7.2.1 Must

Starting with the 'Must' requirements, Table 6. Evaluation of non-functional requirements shows that most of them are well integrated. The municipality gave positive reactions on which and how their existing projects are illustrated. The effect of a network of SRB's is shown in the video, so this requirement could also be considered as done. However, as explained before, in the evaluation with stakeholders, a discussion was started resulting in a new idea of a scene representing this effect even better.

There was tried to explain the inhabitant that he/she is necessary for the project to work by adding a motivating slogan at the end of the video. "Only together we keep Enschede liveable", demonstrates the relevance of civil participation in this kind of problem solving.

The requirement concerning the addressing of people who are already interested in buying a rain barrel is marked as semi-integrated. The animation video addresses all inhabitants, so not only

those who are already planning to purchase a rain barrel. However, this particular target group is probably easier triggered by the animation because explained is that the municipality will help in making the barrel smart. Furthermore, this sub target group is a part of the whole population in Enschede, which is being addressed.

7.2.2 Should

From literature was retrieved that evoking activating emotions as anxiety, shame, anger, hope and enthusiasm make content more likely to be socially transmitted. Evoking anxiety and anger was done by showing the climate change including its causes and consequences. The stakeholders evaluated this part positively, because their experience with climate adaptation among inhabitants showed that a bit of exaggeration is needed get their attention. They described that it will not make people too afraid, because they are already confronted with this message a lot in their daily lives. The video ends with a hopeful message and represents the project as something attractive to participate in. This covers almost all essential aspects of the ‘Should’ requirements.

Only ticking the requirement concerning drinking water waste is disputable. This aspect is left out totally, but the end result still matches this requirement (the relation between the amount of focus on the drinking water waste- and rainwater management problems is less than 1:5).

7.2.3 Could

There was chosen for a simplistic, generalising visualization of inhabitants of Enschede. This contradicts the ‘Could’ requirement of including different kind of inhabitants for the sake of comparison. Because this was a ‘Could’ requirement, there was chosen to not take it into account while making the decision of using standard characters to represent the inhabitants.

7.3 Functional Requirements Evaluation

The functional requirements are also evaluated with the stakeholders and displayed in Table 7 with their degree of integration visualized. In order of importance, the requirements of different MoSCow categories are discussed.

MoSCoW Requirement

Must	<ul style="list-style-type: none"> - Dutch language, English subtitles - Be an Animation - Visualize rain as something positive (in the end) - Show recognizable logos of the three stakeholders - Have a length below 3 minutes
-------------	---

	<ul style="list-style-type: none"> - Add Raintower logo - Show that a normal rain barrel can be made smart and that the process of making it smart can be done easily - Show the causes and consequences of RWM problems in Enschede with visualizing the strain on the sewerage system and floods in streets - Make the involvement of University of Twente, waterboard Vechtstromen and municipality of Enschede clear by letting them be represented by characters in the animation
Should	<ul style="list-style-type: none"> - Include the extra problem caused by the climate change; heat stress
Could	<ul style="list-style-type: none"> - Contain a personal storyline which follows a certain inhabitant - Visualize different type of families and show the different advantages they gain from an SRB - Zoom in to specific, common known spots as streets (e.g. de Heurne or the Getfertsingel) and show how they're affected by the floods.
Would	<ul style="list-style-type: none"> - Include an interactive action to involve the viewer in the problem-solving process by let him choose which information he wants to collect and from which stakeholder

Table 7. Evaluation of functional requirements

7.3.1 Must

The functional requirements were easier to tick off. The requirements concerning language, length, the Raintower logo and the stakeholder characters are clearly integrated. The requirement about positive visualization of rain in the end is considered to be semi-integrated. This is because there is no difference between the visualization of rain in the beginning and end of the video, both positive. Concluded was that this requirement is still fulfilled enough for not bothering the rest of the campaign and its goal.

A practical comment from Vechtstromen was the fact that the character representing their organization is wearing a certain blue coloured shirt, which differs from their corporate identity blue colour. This could create confusion and is not in line with their marketing rules, so should be adjusted. However, because their logo is clearly presented and the other parties are represented as wished, the requirement is marked as semi integrated. When the campaign will be published, this comment will be taken into account.

7.3.2 Should

Heat stress is another problem caused by climate change and should be involved in the animation. The consequences concerning rainfall should be explained too. These facts are involved, but shortly, in one sentence. This requirement was considered important by the municipality. So during the evaluation, in

particular they were asked about their agreement with the limited time of discussing this problem. Concluded was that this small explanation in combination with the supporting animation was enough.

7.3.3 Could

The ‘Could’ requirement about the personal storyline was not included because there was chosen for a more generalized visualization of all of the inhabitants of Enschede, which will address more people.

The animation also does not include the comparison of benefits for different kind of families. However, in the “What’s in it for us”-campaign this aspect is covered extensively. During the process there was decided was to keep the focus of the “What’s in it for Enschede”-campaign on the general benefit.

The third functional ‘Could’ requirement was semi-integrated. Two specific, well-known streets located in Enschede are used in the video (the Geftertsingel and Heurne). A pessimistic scenario is illustrated in which those streets are flooded. So this aspect is integrated, but there is not zoomed in on the streets and shown in detail how they suffer from floods nowadays.

7.3.4 Would

The interactive ‘Would’ requirement is not integrated, but could be executed if the Raintower campaign is expanded and/or if the three sub-campaigns are combined on one platform. The interactive aspect could be used to let the user choose which part of the campaign to see (first).

7.4 Conclusion

The stakeholders were all very satisfied with the result, but during the evaluation meeting new ideas for future work were generated. After reviewing the end result by hand of ticking of requirements, concluded can be that the most important aspects are all included in the animation. Most of the ‘Could’ and ‘Would’ requirements were not included, but some could also serve in the future for other campaigns or while expanding this one.

Chapter 8: Conclusions and Future Work

During the execution of this project, there was held on to one clear goal. This goal was to design an online campaign activating inhabitants to adopt the Raintower solution. In this chapter, there is taken a look at if and how this goal is reached. Additionally, options for further research are listed.

8.1 Conclusions

The CTDP (Mader & Eggink, 2014) was followed during the entire process and gave the development stages more structure. With the use of iteration and feedback loops, there was made sure that choices concerning design, story and message were made only after extensively having studied other options. The CDTP closes the cycles within the different stages with a conclusion at the end.

From literature, state of the art and interviews with stakeholders, the first part of the research question was answered. Concluded was how inhabitants can be motivated by the use of evoking activating emotions. These emotions can be triggered with visual aspects and with the message. Additionally, there was found how to make them feel involved, which also contributes to a more positive attitude towards the presented product. These findings in combination with preliminary requirements were taken into account in further development process.

After deciding the online campaign would be in form of an attractive, bright-colored animation, preliminary concepts were created. The goal of activating inhabitants needed to be achieved by at least including three specific aspects. Firstly, the role of the municipality in the Raintower- and other RWM projects needed to be clear. Secondly, the Smart Rainwater Buffer and Raintower project needed to be introduced. Lastly, the importance and need of the viewers contribution needed to be pointed out.

These three aspects were all included in the end result during the realization phase. The final step in developing was evaluating the final product with the stakeholders. Together with the municipality of Enschede, waterboard Vechtstromen and the University of Twente the animation was evaluated and requirements were checked. These stakeholders did approve the video and want to use it while campaigning the Raintower project. Concluded can be that the goal is reached, but one important stakeholder is not yet being questioned about the aspects and effect of the video. Inhabitants of Enschede were not involved during this research which results in insecurities concerning whether or not the goal is achieved. However, they partly are being represented by the municipality who shared extensive experience about activating inhabitants and already did large-scaled research in this field.

The answer on the research question *“How to activate inhabitants of Enschede, by means of an online campaign, to adopt the Raintower solution?”* can be summarized as follows. With the use of an attractive and accessible animation, inhabitants can be activated and stakeholders can be represented in a way they want to. Negative activating emotions are evoked by showing the problem statement, followed by more positive content containing the solution.

8.2 Future Work

This project can be seen as one with an open ending. Therefore, plans and ideas to execute in the future are being proposed.

Firstly, in the evaluation with the stakeholders, a concrete plan for future work was generated. A proper prototype of an online campaign is developed, but it needs some adjustments. The core and aesthetics are approved, but a new scene will be added in the future. This scene will visualize the relation between the positive consequences of the existing RWM-projects and the Raintower project in the future. This scene will enhance the feeling of social cohesion and working together (with each other and the municipality) towards a greater goal.

To make the research complete and be able to give a more elaborate answer on the research question, the animation can be tested with inhabitants of Enschede. This also can contribute to defining the right target group within the inhabitants. As was explained before, for now the research question is being answered based on sufficient considered experience from the municipality concerning the activations of inhabitants.

Thirdly, looking at the broad options of advertising online, thoughts can be given to the further campaigning process. Social media platforms can be used, the animation can be played in the city hall, or somewhere else in the city. Important to keep in mind in this research is the target group that needs to be focused on in this stage. The municipality already pointed out that certain social groups will not adopt to the Raintower solution in this phase and a campaigning video will not change that. They will possibly only adopt if they are inspired by their own social circle. Also students will probably not be part of the early adopters, because of for instance money issues, lack of interest and the absence of a garden.

The Raintower project could be executed in other cities as well, in the future. Enschede is not the only city suffering from floods. The underlying message and animation style could be used in campaigning in other cities, but the rest of the content needs to be changed and adjusted to that certain city.

References

- 1Twente (2017, October 18) Stadsbeek 't Bruggert in Enschede krijgt vorm. Enschede. Retrieved April 2, 2019, from <http://enschede.1twente.nl/stadsbeek-t-bruggert-in-enschede-krijgt-vorm/nieuws/item?995199>
- Adobe. (n.d.). Basics of rendering and exporting in After Effects CC. Retrieved June 15, 2019, from <https://helpx.adobe.com/after-effects/using/basics-rendering-exporting.html>
- Ainsworth, S. (2008). How do animations influence learning? In D. Robinson & G. Schraw (Eds.), *Current Perspectives on Cognition, Learning, and Instruction: Recent Innovations in Educational Technology that Facilitate Student Learning*. pp 37-67. Information Age Publishing.
- Amelia. (2018, December 10). Website Colour Schemes that Look Amazing: 30 Colour Palettes. Retrieved April 4, 2019, from <https://wpamelia.com/website-colour-schemes/>
- Amsterdam Rainproof. (n.d.). About Rainproof. Retrieved April 1 from <https://www.rainproof.nl/English>
- Animatiewerkplaats. (2019, January). 'Bezoekersbijdrage'. Retrieved April 1, 2019 from http://www.animatiewerkplaats.nl/portfolio/ga_tb.html
- Anttila, H., Pyhältö, K., Soini, T., & Pieatarinen, J. (2017). From anxiety to enthusiasm: Emotional patterns among student teachers. *European Journal of Teacher Education*, 40(4), 447. <https://doi.org/10.1080/02619768.2017.1349095>
- Berger, J., & Milkman, K. L. (2012). What Makes Online Content Viral? *Journal of Marketing Research*, 49(2), 192–205. <https://doi.org/10.1509/jmr.10.0353>
- Bødker, S. (2000). Scenarios in user-centred design—setting the stage for reflection and action. *Interacting with Computers*, 13(1), 61–75. [https://doi.org/10.1016/s0953-5438\(00\)00024-2](https://doi.org/10.1016/s0953-5438(00)00024-2)
- Brochado, A., Teiga, N., & Oliveira-Brochado, F. (2016). The ecological conscious consumer behaviour: are the activists different? *International Journal of Consumer Studies*, 41(2), 138–146. <https://doi.org/10.1111/ijcs.12321>
- Brugha, R. & Varvasovszky Z. (2000). Stakeholder analysis: A Review. *Health policy plan* 15 (3) 239-46.
- Bults, R., Teekens, H., & Buitenweg, J. (2019). De Regentoren: een netwerk van slimme regenwaterbuffers op particulier terrein. *Kennisportaal*. Retrieved March 25, 2019 from <https://ruimtelijkeadaptatie.nl/voorbeelden/overzicht-projecten/@206863/Raintower/>
- CBS, PBL, RIVM, WUR (2019). [Meteorologische gegevens, 1990-2018](#) (indicator 0004, versie 21 , 25 april 2019). Centraal Bureau voor de Statistiek (CBS), Den Haag; PBL Planbureau voor de Leefomgeving, Den Haag; RIVM Rijksinstituut voor Volksgezondheid en Milieu, Bilthoven; en

- Wageningen University and Research, Wageningen. Retrieved March 6, 2019, from:
<https://www.clo.nl/indicatoren/nl0004-meteorologische-gegevens-in--nederland>
- Centers for Disease Control and Prevention. (2012, May 11). Program Evaluation Guide - Step 1 - CDC. Retrieved June 3, 2019, from <https://www.cdc.gov/eval/guide/step1/index.htm>
- Creighton, J. L. (2005). *The Public Participation Handbook: Making Better Decisions Through Citizen Involvement*. Jossey-Bass, United States of Ame: Wiley.
- Charizanis, A. (2019). Climate Adaptation Smart Rainwater Buffering Campaign. Retrieved from
https://essay.utwente.nl/77313/8/Charizanis_Creative_Technology_EEMCS.pdf
- Environment Agency (2010, Oktober) Harvesting rainwater for domestic uses: an information guide. Almondsbury, Bristol
- Fraj, E., & Martinez, E. (2006). Influence of personality on ecological consumer behaviour. *Journal of Consumer Behaviour*, 5(3), 167–181. <https://doi.org/10.1002/cb.169>
- Gemeente Enschede. (2019, January). Start eerste fase werkzaamheden Oldenzaalsestraat. Retrieved February 25, 2019, from: <https://www.enschede.nl/centrum/nieuws/start-eerste-fase-werkzaamheden-oldenzaalsestraat>
- Heath, C. (1996). Do people prefer to pass along good news or bad news? Valence and relevance of news as a predictor of transmission propensity. *Organizational Behavior and Human Decision Processes*, 68, 79–94. <https://doi.org/10.1006/obhd.1996.0091>
- Hofman-Caris, R., Bertelkamp, C., De Waal, L., Van den Brand, T., Hofman, J., Van der Aa, R., & Van der Hoek, J. (2019). Rainwater Harvesting for Drinking Water Production: A Sustainable and Cost-Effective Solution in The Netherlands? *Water*, 11(3), 511. <https://doi.org/10.3390/w11030511>
- Isaksen, S. G., & Gaulin, J. P. (2005). A Reexamination of Brainstorming Research: Implications for Research and Practice. *Gifted Child Quarterly*, 49(4), 315–329. <https://doi.org/10.1177/001698620504900405>
- Jacobson, S. (2015, June 15). The Ultimate Guide to Audio for Animation. Retrieved June 16, 2019, from <https://blog.toonboom.com/how-to/the-ultimate-guide-to-audio-for-animation>
- Khastagir, A., & Jayasuriya, N. (2010). Optimal sizing of rain water tanks for domestic water conservation. *Journal of Hydrology*, 381(3-4), 181–188. <https://doi.org/10.1016/j.jhydrol.2009.11.040>
- Kim, S., Yoon, M., Whang, S., Tversky, B., & Morrison, J. (2007). The effect of animation on comprehension and interest. *Journal of Computer Assisted Learning*, 23(3), 260–270. <https://doi.org/10.1111/j.1365-2729.2006.00219.x>
- KNMI. (n.d.). KNMI - Klimaatkennis paraat in 10 vragen. Retrieved April 29, 2019, from - <https://www.knmi.nl/kennis-en-datacentrum/achtergrond/klimaatkennis-paraat-in-10-vragen>
- Kunst, A. (2010, updated in 2017). Wateroverlast in beeld. *Tubantia*. Retrieved March 23, 2019 from: <https://www.tubantia.nl/overig/wateroverlast-in-beeld~aec79258/>

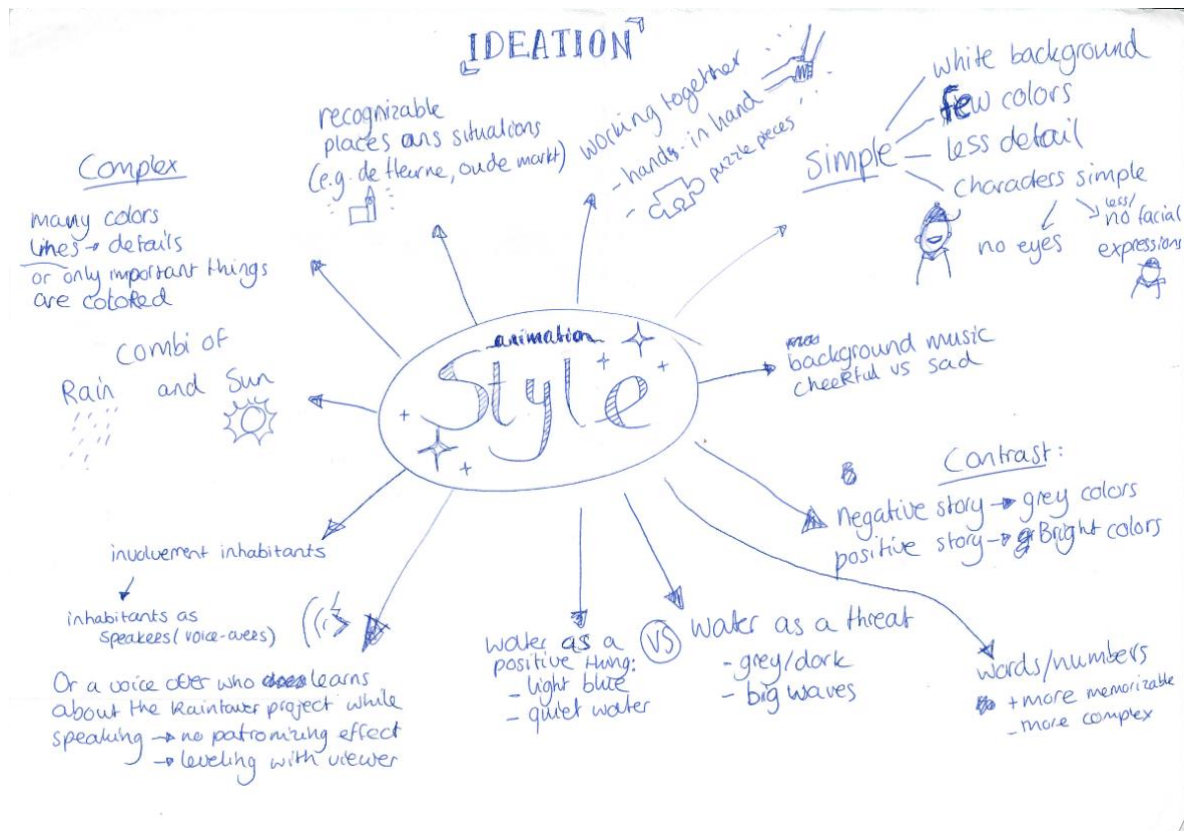
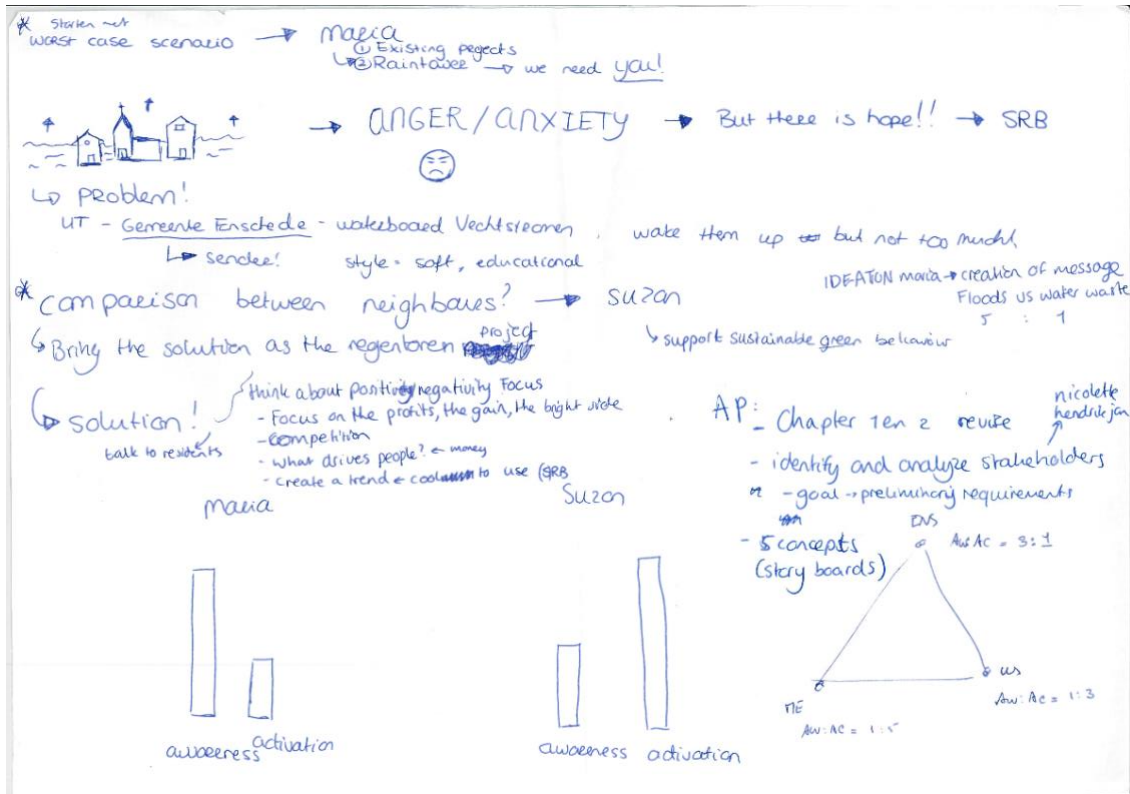
- Louwes, W. (2018, November 6). Oldenzaalsestraat in centrum Enschede krijgt waterberging en groenstrook in één. *Tubantia*. Retrieved February 20, 2019, from: <https://www.tubantia.nl/enschede/oldenzaalsestraat-in-centrum-enschede-krijgt-waterberging-en-groenstrook-in-een~a7acf055/>
- Mader, A. & Eggink, W. (2014) A design process for creative technology . International conference on engineering and product design education, The Netherlands .
- Manchester Metropolitan University (n.d.). Stakeholder Analysis Toolkit <https://www2.mmu.ac.uk/media/mmuacuk/content/documents/bit/Stakeholder-analysis-toolkit-v3.pdf>
- McKenzie-Mohr, D. (2000). New Ways to Promote Proenvironmental Behavior: Promoting Sustainable Behavior: An Introduction to Community-Based Social Marketing. *Journal of Social Issues*, 56(3), 543–554. <https://doi.org/10.1111/0022-4537.00183>
- Michels, A., & De Graaf, L. (2017). Examining citizen participation: local participatory policymaking and democracy revisited. *Local Government Studies*, 43(6), 875–881. <https://doi.org/10.1080/03003930.2017.1365712>
- Ministry of Infrastructure and Water Management. (2018, September 12). Ruimtelijke adaptatie. Retrieved April 29, 2019, from <https://www.deltacommissaris.nl/deltaprogramma/gebieden-en-generieke-themas/ruimtelijke-adaptatie>
- Panov, V. (2013). Ecological Thinking, Consciousness, Responsibility. *Procedia - Social and Behavioral Sciences*, 86, 379–383. <https://doi.org/10.1016/j.sbspro.2013.08.583>
- Prins, J. (2007) Kostbaar drinkwater wordt in ons land verspild. Trouw. *Met veel moeite gezuiverd water gaat met liters door het afvalputje het riool in*. Retrieved April 1 from <https://www.trouw.nl/home/kostbaar-drinkwater-wordt-in-ons-land-verspild~ab86d255/>
- Rashwan, A. (2012). Semantic Analysis of Functional and Non-Functional Requirements in Software Requirements Specifications. *Advances in Artificial Intelligence*, 388–391. https://doi.org/10.1007/978-3-642-30353-1_42
- Sanders, A. (2019, March 30). How to Create a Basic 8-Frame Animated Walk-Cycle. Retrieved April 12, 2019, from <https://www.lifewire.com/flash-basic-walk-cycle-140629>
- Smith, C. (2018, September 30). What is After Effects. Retrieved June 15, 2019, from <https://www.agitraining.com/adobe/after-effects/classes/what-is-after-effects>
- Staddon, C., Rogers, J., Warriner, C., Ward, S., & Powell, W. (2018). Why doesn't every family practice rainwater harvesting? Factors that affect the decision to adopt rainwater harvesting as a household water security strategy in central Uganda. *Water International*, 43(8), 1114–1135. <https://doi.org/10.1080/02508060.2018.1535417>
- The DSDM Agile Project Framework (2014 Onwards). (2017b, June 15). Retrieved May 12, 2019, from <https://www.agilebusiness.org/content/moscow-prioritisation>

- Weber, H. (2013, May 6). Adobe Abandons Its Creative Suite to Focus on Creative Cloud. The Next Web. *The Next Web*. Retrieved July 8, 2014 from:
<https://thenextweb.com/insider/2013/05/06/after-nearly-10-years-adobe-abandons-its-creative-suite-entirely-to-focus-on-creative-cloud/>
- Zhang, S., Zhang, J., Yue, T., & Jing, X. (2019). Impacts of climate change on urban rainwater harvesting systems. *Science of The Total Environment*, 665, 262–274.
<https://doi.org/10.1016/j.scitotenv.2019.02.135>
- Zorn, T. (2010). Designing and Conducting Semi-Structured Interviews for research. Retrieved May 1, 2019 from: <http://home.utah.edu/~u0326119/Comm417001/resources/Interviewguidelines.pdf>

Appendices

Appendix A: Stakeholder Meetings

A-1: Brainstorm with University of Twente



A-2: Semi-structured Interview topics (Municipality of Enschede)

Interview topics municipality of Enschede: Nicolette Hoogeveen

Language: Dutch

General questions:

- What are your opinions about the “What’s in it for me?” campaign?
 - What were positive aspects?
 - What could be changed in this campaign?
 - What do you think of the style of the campaigning video?
- What is the required length of the animation video? Should the video consists of certain colours or do you prefer a certain style?
- Are there examples of other campaigning videos available, where the campaign is also communicated towards the inhabitants of Enschede?

Specific questions “What’s in it for Enschede?” campaign:

- To what extent would you like to see the municipality of Enschede represented in the campaigning video?
- The ideas for the “What’s in it for Enschede?”-campaign tend to very educational ones with no personal attaching stories involved. What do you think about this evolution?
- What do you think about showing the Oldenzaalsestraat (sewerage system and wadi’s) and the Roombeek as only existing RWM-projects?
- Do you think there is another way to involve inhabitants in the problem solving? From literature I retrieved that civil participation only works when they are involved from the beginning. Is there another option to let them contribute actively in another way?

Specific questions “What’s in it for us?” campaign:

- Do you think the target group should focus on people living on top of the moraine or the people living in the lower areas of the city?
- Are there any trends in certain neighbourhoods in terms of solar panels for example? Do people follow up on each other in this type of trends?
- Out of literature research there can be concluded that social pressure influences behaviour. Do you see this social pressure factor neighbourhoods?
- What is according to you the best way to activate the inhabitants of Enschede? Should the message consist of certain emotions, such as anger, anxiety and awe?

A-3: Semi-structured Interview topics (Waterboard Vechtstromen)

Interview waterboard Vechtstromen: Jeroen Buitenweg

General questions:

- What is exactly the contribution of the waterboard Vechtstromen to the 'Raintower' project, why are they contributing?
- What are your opinions about the "What's in it for me?" campaign?
 - What in this campaign was done well?
 - What could be changed in this campaign?
 - What do you think of the style of the campaigning video?
- What is the waterboard Vechtstromen currently doing to lower the pressure on the sewerage system? Are there any solutions?
- Which neighbourhood or group would you pick as a target group? Potential rainwater buffer buyers?

Specific questions storyboard "What's in it for Enschede?" campaign:

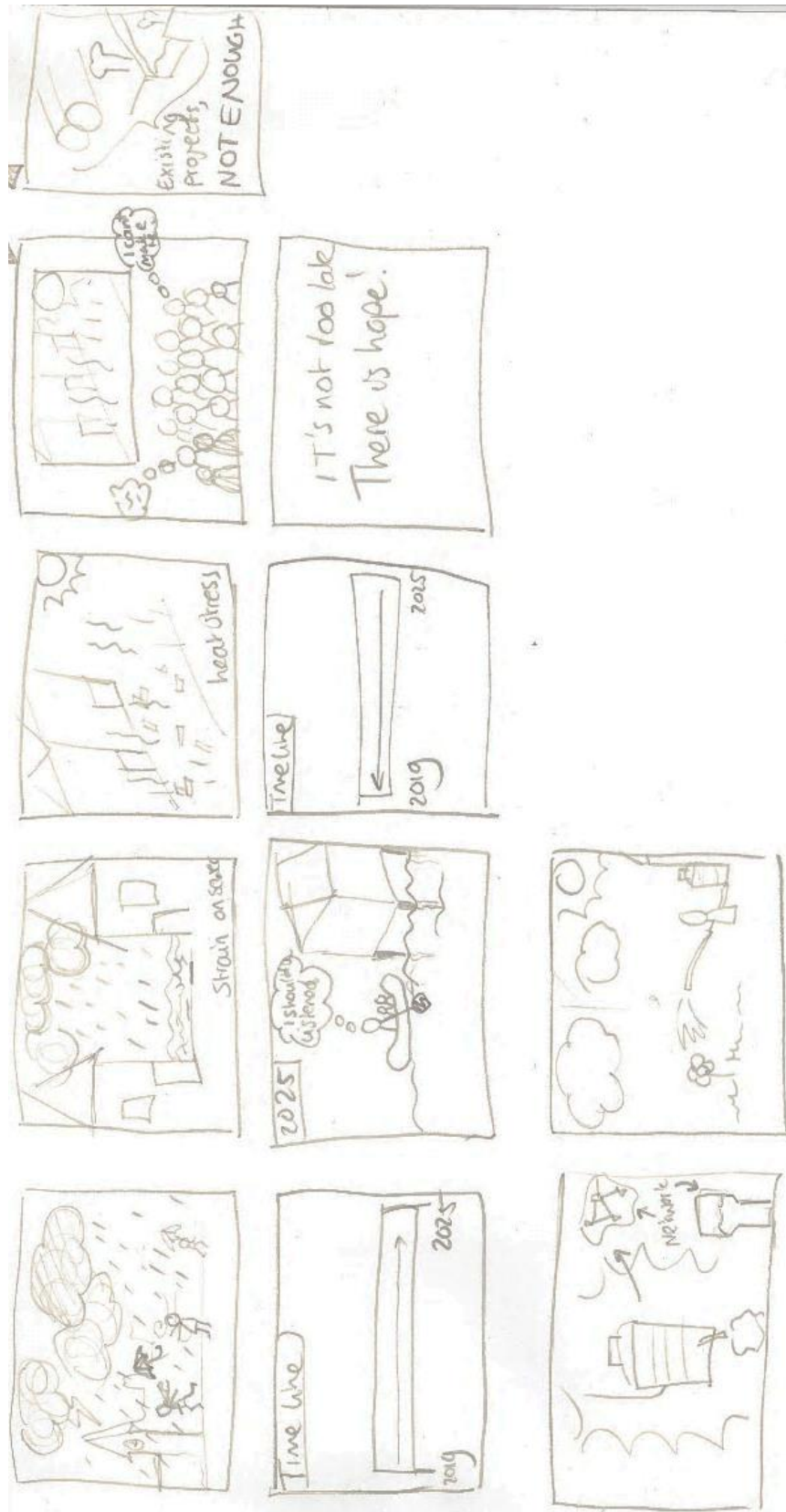
- Is it clear what message the waterboard Vechtstromen is telling you in this storyboard?

Specific questions storyboard "What's in it for us?" campaign:

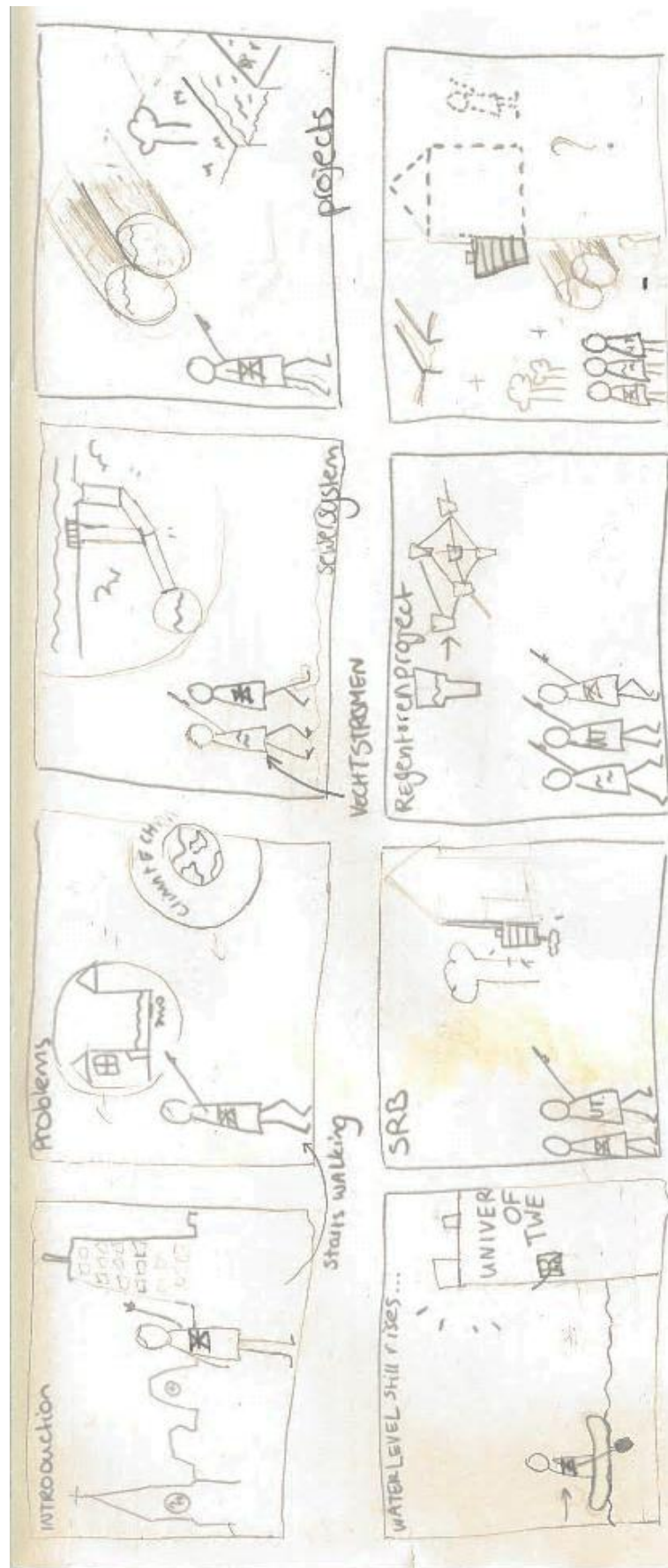
- Is the story and message of this storyboard clear?
- Is it according to you necessary to show more about the pressure on the sewerage system? Or is this irrelevant in this campaign?

Appendix B: Ideation Concepts

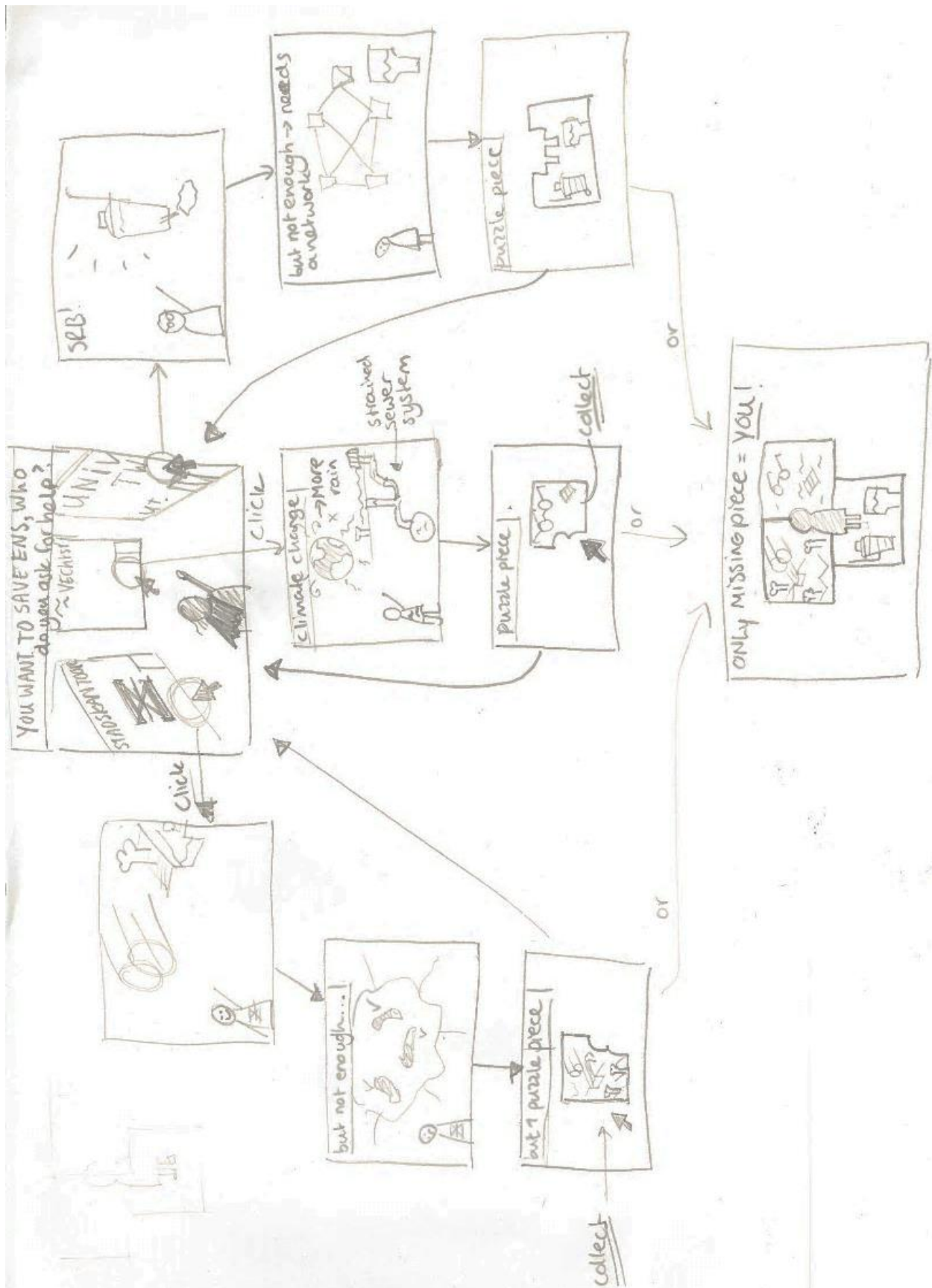
B-1: Storyboard "Time Travel"



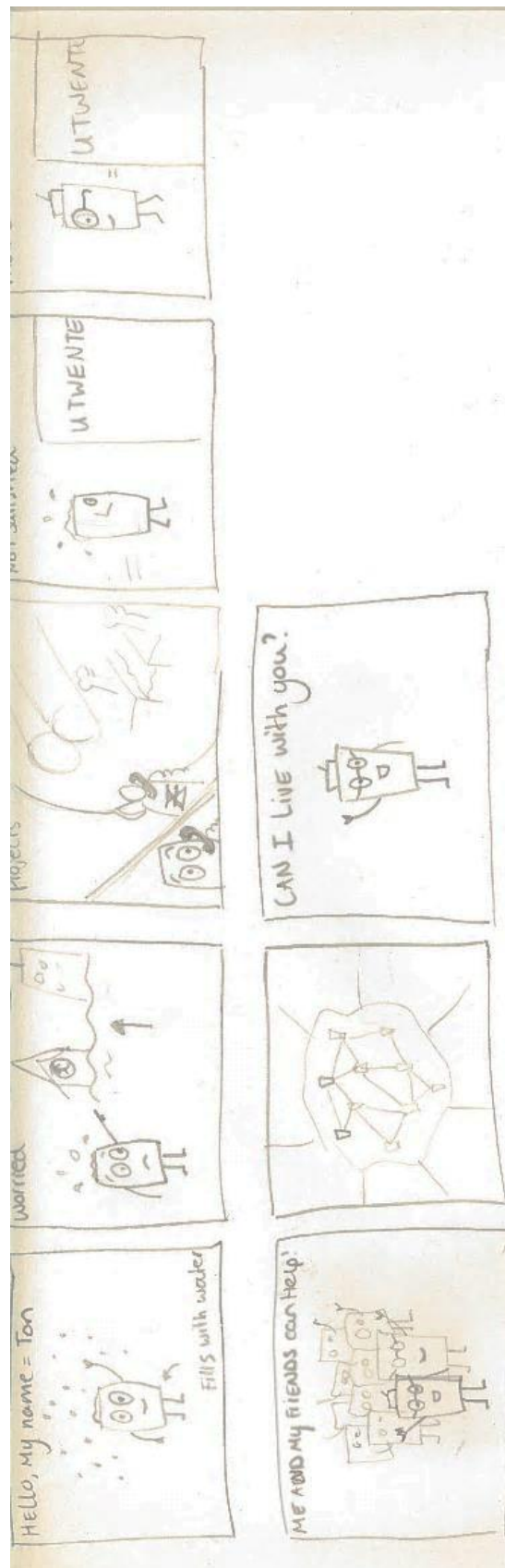
B-2: Storyboard "Only moving forward"



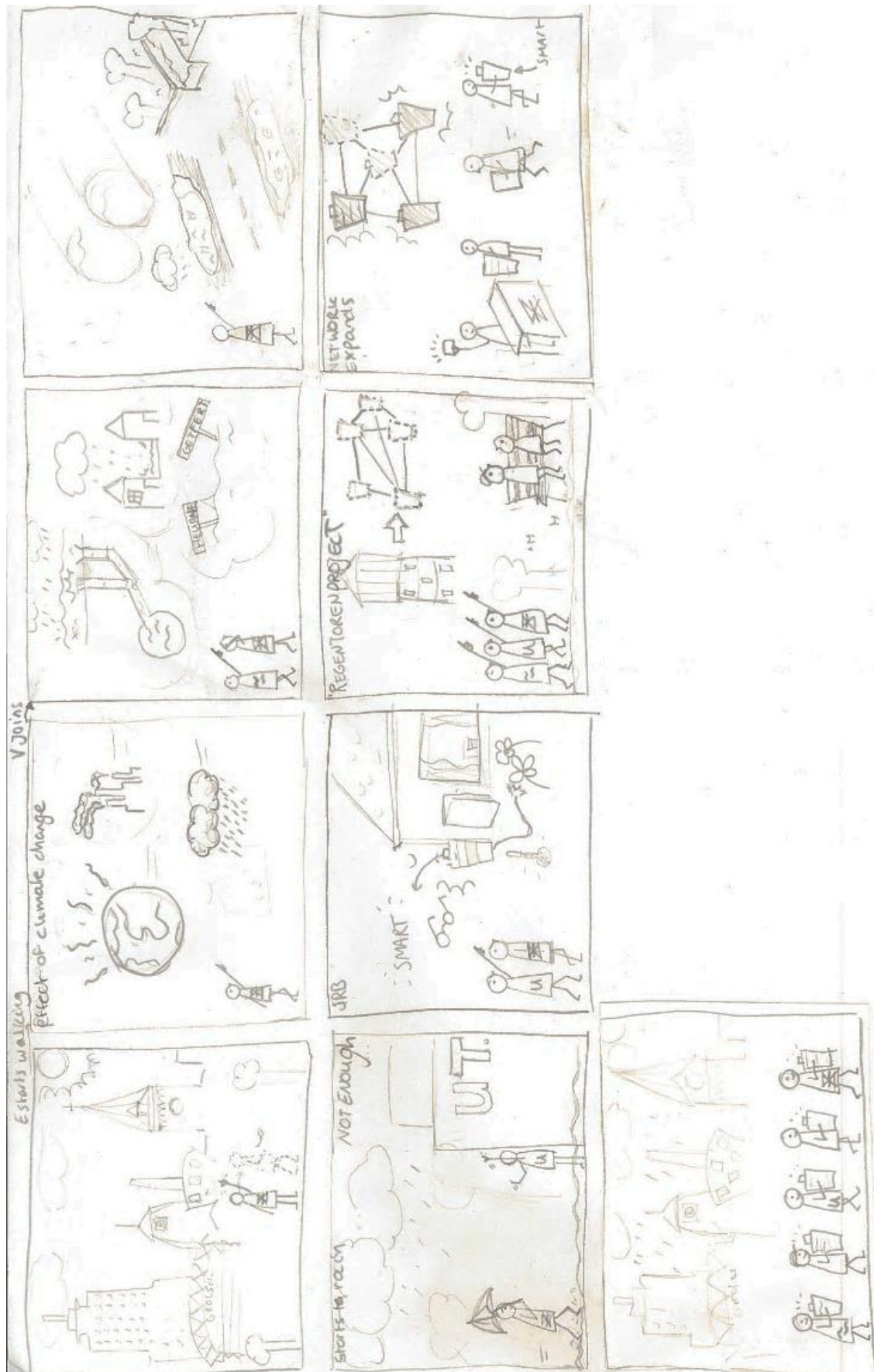
B-3: Storyboard "The missing piece is YOU"



B-4: Storyboard "Meet Ton, the SRB"



Appendix C: Final Storyboard



Appendix D: Script

Scene	Dutch Voice Over	English Subtitles
Skyline [Character walks]	<i>Enschede, misschien wel de mooiste stad van Nederland.</i>	Enschede, it might be the prettiest city of the Netherlands.
Skyline [Character stands still]	<i>Als gemeente zijn we druk bezig dit zo te houden, maar dat wordt steeds lastiger.</i>	As municipality, we are doing our best to keep it this way, but this is getting harder.
Climate change	<i>Door de toenemende hoeveelheid van broeikasgassen in de lucht, warmt de aarde steeds meer op. Omdat warme lucht vochtiger is, zullen we hevige regenbuien in de toekomst vaker tegenkomen.</i>	Because of the increase of greenhouse gases in the atmosphere, the earth heats up. Warm air is more humid, which causes more and heavier rain showers.
Problem explanation [Waterboard joins]	<i>Met waterschap Vechtstromen verdiepen wij ons al langer in dit probleem. Enschede ligt aan de voet van een helling, wat zorgt voor nog meer regenwateroverlast. Omdat het riool overbelast kan zijn tijdens en na zo'n hevige regenbui, kunnen straten onder water komen te staan.</i>	Together with Vechtstromen, we are already trying to fix these problems. Enschede is located at the foot of a moraine, which causes more rainwater problems. The sewerage system can be strained during and after such a shower and streets can get flooded.
Existing projects [Oldenzaalsestraat]	<i>Dit probleem proberen we al op te lossen met een aantal projecten. Zo worden er onder de Oldenzaalsestraat buizen geplaatst, die overtollig water kunnen opvangen. Naast het wegdek komen wadi's, die als het hard regent veranderen in een vijvers. Uiteindelijk zal hier 7 miljoen liter water kunnen worden opgevangen.</i>	We are already trying to fix this problem with certain projects. Below the Oldenzaalsestraat, pipes are being placed to buffer redundant rainwater. Next to the road, wadi's will be placed which turn into pools during heavy rainfall. Eventually, 7 million litres will be able to be buffered.
Existing projects [Roombeek]	<i>Ook in Roombeek zijn er maatregelen getroffen. Hier is een stadsbeek aangelegd die bijdraagt aan de leefbaarheid, maar ook regenwateroverlast vermindert.</i>	We also took measures in Roombeek. An urban stream is created which contributes to liveability, but also reduces rainwater problems.

University of Twente	<i>Helaas is dit nog niet genoeg. Dit is waarom we samen met de Universiteit Twente en Waterschap Vechtstromen de slimme regenwaterton willen introduceren.</i>	Unfortunately, this is not enough. That is why, together with waterboard Vechtstromen and the University of Twente, we want to present the Smart Rainwater Buffer.
Explanation SRB	<i>Deze ton kan bij jou in de tuin staan en vangt regenwater op. Dit water kan je bijvoorbeeld gebruiken om je tuin te onderhouden. De ton is slim, wat betekent dat het weet wanneer er een bui op komst is. Water wordt dan alvast losgelaten zodat er weer ruimte vrijkomt voor nieuw regenwater.</i>	This barrel can be placed in your garden and buffers rainwater. The buffered water can be used for, for instance, gardening. The SRB is smart which means that it knows whether a rainshower is coming up. If so, water is being released to make room for new rainwater.
Network of SRB'S	<i>Verschillende slimme regentonnen functioneren gezamenlijk als een regentoren, ze slaan water op tijdens regenbuien en leveren regenwater tijdens periodes van droogte. Samen zullen ze zorgen voor minder overstromingen en dat tuinen er weer gezond uit zien!</i>	Different SRB's work together as a raintower. They buffer water during rainshowers and provide it during times of drought. Together they will reduce the floods and improve the quality of the gardens!
Municipality hands out smart parts	<i>Doe mee aan het 'Regentoren' project en koop een regenton! Enschede zal je helpen deze slim te maken.</i>	Join in to the Raintower Project and buy an SRB! Enschede will help you to make it smart.
Ending scene	<i>Alleen samen houden we Enschede leefbaar!</i>	Only together, we keep Enschede liveable!