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Risk perception and evacuation behaviour

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Living Lab Polder2cs
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D2.5.1 Report on findings risk perception and evacuation behavior

Guidance for the reader

This study builds on previous reports for which citizens were interviewed about flood risk in the area around the Hedwige-Prosperpolder and about their flood risk perception.

These insights have been used to develop an information experiment, based on information from flood risk and emergency response experts, a flood risk scenario and knowledge about behaviour in a flood emergency.

This report contains an overview of all steps conducted for the information experiment, the results and conclusions.

The results of the flood risk experiment have been used in a Joint learning event. In this event both flood risk / emergency response professionals and inhabitants from the area shared their view on the results of the information experiment. In the event professionals and inhabitants also discussed about the results, which provides relevant insights for collaboration with inhabitants in emergency response.

Documentary included in toolbox

As part of this report a documentary has been developed to test risk communication messages with citizens. The documentary (video) itself is included in the toolbox of Polder2cs about emergency response.

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1 INTRODUCTION

1.1 BACKGROUND AND GOAL

The Netherlands is a country that is vulnerable for flooding: more than a quarter of the land is situated below sea level and almost one third of the land is at risk for river flooding (Ministry of Infrastructure and Water Management, 2021). Even though this vulnerability for floods would appear as something that can be alarming for people living in these areas, local citizens have a low perception of water risks (OECD, 2014). Because of a great trust in the protective measures taken by the government and a policy based on avoidance of disasters (heritage of the Watersnoodramp of 1953) many people are not aware of basic evacuation policy and whether they live on a flood plain (OECD, 2014). According to Buijs et al. (2020), the main lesson learned regarding preparedness and preventative actions is the need to change the perception of stakeholders about flood risk and increase their flood risk awareness.

To change the perception about flood risk and increase flood risk awareness, a documentary will be developed and tested as a communication tool to raise awareness on flood risk. This study will be conducted by the HZ University of Applied Sciences in the Living Lab Polder2Cs among inhabitants living near the Hedwige-Prosperpolder. The Hedwige-Prosperpolder is a project concerning an experiment in managed realignment: restoring salt marsh ecosystems by moving a dyke land inward, as a measure to integrate biodiversity and water safety objectives. The decision-making to use this area for nature restoration has raised protests, but has also taught important lessons can be learned for innovative coastal management. The project of the Hedwige-Prosperpolder resulted in the founding of the Living Lab Polder2Cs where current and innovative techniques, processes, methods and products can be tested in a real-life environment for practical validation.

For this flood risk perception study HZ aims to design and test an information experiment in the form of a documentary, in order to develop applied knowledge about how local inhabitants perceive flood risk communication and how this can support professionals to improve communication strategies for emergency management. This documentary aims at raising interest and general knowledge by showing 'behind-the-scenes' how information flows between professional institutes concerning water monitoring, flood prevention and crisis management. The documentary also showcases a worst-case scenario of a situation with a (threatening) dike breach in the larger Hedwige-Prosperpolder area. In terms of facilitating change, the information experiment can be considered as an intervention in the transition to enforce mutual understanding between institutes concerning flood risk management and local society.

1.2 PROJECT DESIGN

The process involved three interventions: the documentary and its development, the information experiment and the joint learning event, all of which involved the active engagement and participation of stakeholders.

In the preparation phase, we conducted a thorough network analysis to gain an understanding of the interdisciplinary field in which FRIEP positions itself, and to identify the key stakeholders in the network. Following up, we designed a storyline with a detailed flood scenario, for which we consulted several stakeholders. Simultaneously, the research design for the information experiment was developed.

In the developing phase, we practically organised and assembled the documentary. This included conducting three interviews with experts, shooting scenic footage, selecting and instructing an animator to create a specific scene, developing a soundscape and fixing the entire montage. The documentary was then refined and optimised through a monitoring and adapting strategy. The second intervention, the information experiment, was developed and executed according to a pre-test-post-test study design and post-test-only control group study design. The results were systematically processed and analyzed by means of SPSS. The third intervention consisted of a joint learning event, that was organised with the purpose of presenting and reflecting on the results from the information experiment and facilitate joint learning among the participating stakeholders.

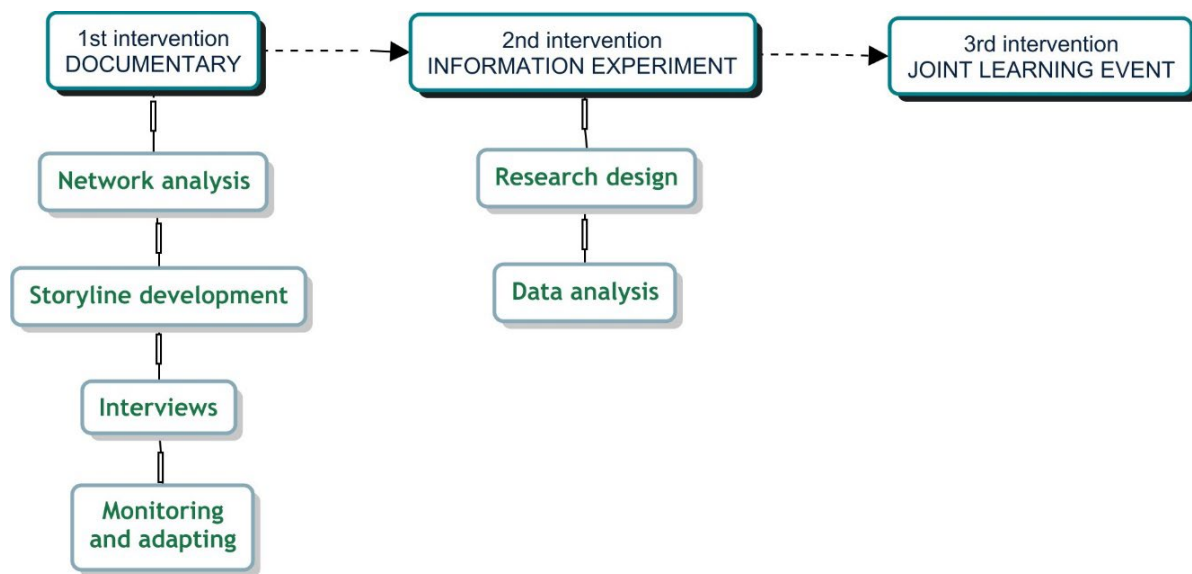


Figure 1 Overview of the project design

1.3 SCENARIO

In this rapport a so-called flood scenario will be used multiple times. This scenario will be integrated in the documentary, but also to conduct part of the research itself. This flood scenario has multiple factors that need to be considered:

- Fictive but possible scenario
- Near project scope (Hedwige-Prosper polder/Municipality Hulst)
- Affecting large area

The cause of the flood itself is taken out of the equation because this shouldn't influence people's behavior. What is important is this scenario consists of an imminent threat. This means there isn't enough time for governmental agencies to perform a preventive evacuation procedure.

The scenario is defined as followed: *an imminent threat (24<0 h) of a dike breach near Kloosterzande, Walsoorden and Ossensisse (municipality of Hulst), where 3.830 people are living. No warning possible for evacuation out of area. When the flood hits, maximum water levels can reach up to 4 meters. Most densely populated areas are flooded up to 1 meter. Because the flood has already happened or could happen any moment vertical evacuation generally a safer option.*

In the scenario the breaches will occur in dike segments Wszui - dp 145, 170 and 190 (see *Figure 2*). It is likely to have multiple breaches along these different dike segments because the dike has the same safety level on all sections (Voorde, 2004). With the “old” general standard for dikes in the province of Zeeland (Kok, 2003) there is a chance of 1 in 4000 that the dike will breach.

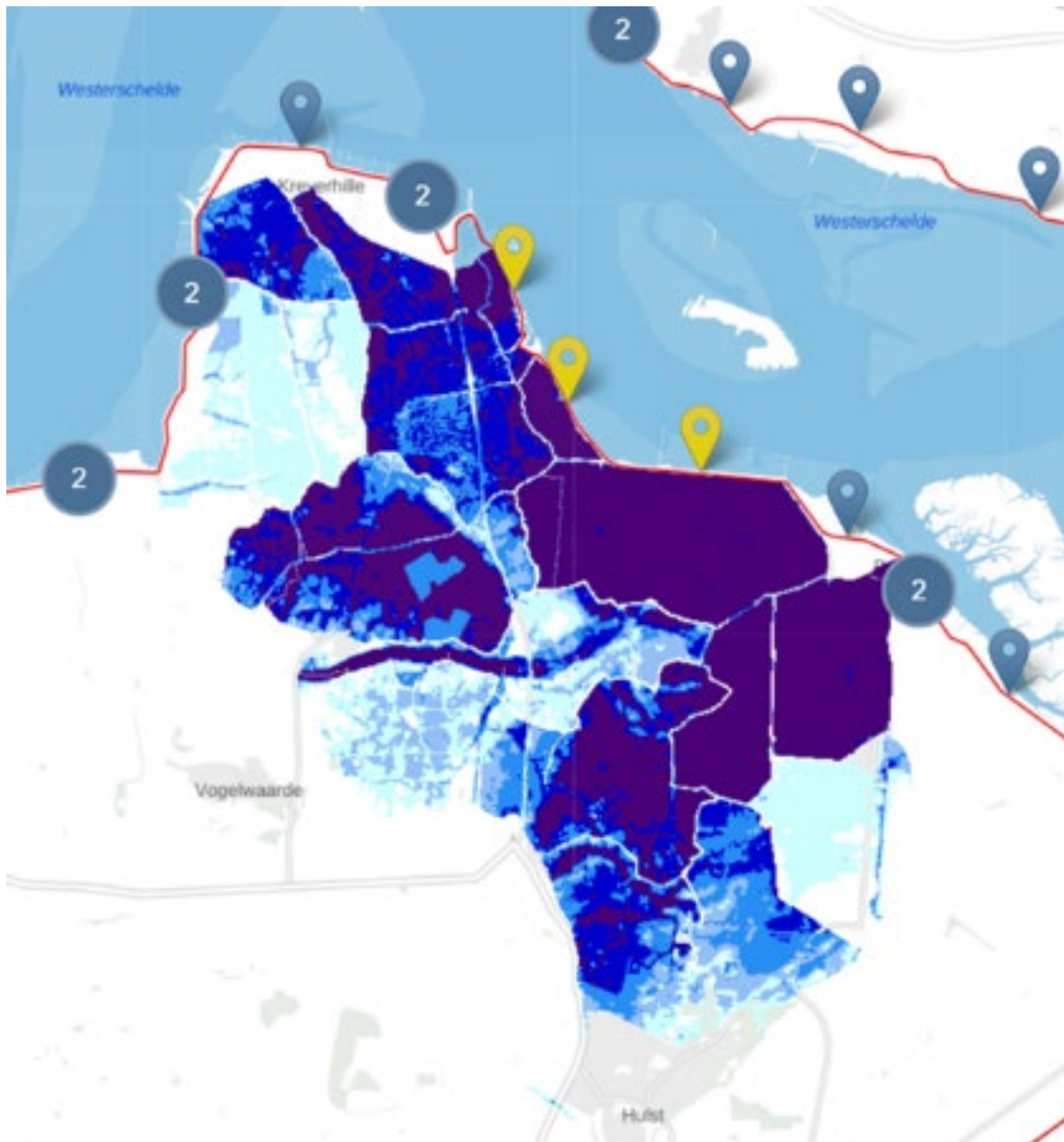


Figure 2 – Applied flood scenario

2 NETWORK ANALYSIS

In the FRIEP Living Lab the main goal is to develop applied knowledge about how inhabitants perceive flood risk communication and how this can support professionals to improve communication strategies for emergency management. To this aim, FRIEP is positioned within three (overlapping) networks: the flood risk management and communication network, the flood risk research network (the Polder2Cs project) and the network of citizens and local inhabitants. While it can be stated that these three networks generally contribute to the same goal, namely minimizing the risk of a flood from sea happening, they differ in terms of power, influence and engagement. This, as can be concluded from the analysis, can sometimes lead to conflicting interests or bottlenecks.

The review of Butts (2008) defines a social network as a set of entities (persons, groups or organisations) which together have a social relation. A social network analysis therefore describes the context and the dimensions of these relations between these groups, persons or organisations. This network analysis is conducted to gain a better understanding of the position of this project in these three networks and function as a decision-making tool to decide on the relevancy of information and resources. The analysis can also help potential follow-up studies that aim to improve communication strategies for emergency management or about the perception of flood risk communication among inhabitants.

2.1 DATA COLLECTION

Data was obtained by desk research in an early stage of the project, and several interviews with major stakeholders representing key parts of the network.

Via the Polder2Cs website (2022) and via the National Flood and Flood Threat Management Plan (2021), a number of the stakeholders in the network were identified. By analysing the websites of stakeholders, a first description of the stakeholders could be made. This description contains the scale on which they operate, the themes and scopes, the projects and activities, the stakes and interests and finally their position: the role and/or tasks are responsible for, or how they contribute to the shared goal.

The interviews and meetings with the different actors, such as the Safety Region of Zeeland and Rijkswaterstaat, were conducted to check and add the data for the network analysis. The transcripts of these interviews and meetings can be found in chapter one to four of the Appendices Document.

2.2 APPROACH OF THE NETWORK ANALYSIS

The network analysis was conducted through use of different methods of analysing in consecutive order. This strategy was used to map and reflect on different aspects and elements involved in the network, as well as sharpening the essence. The network analysis involved stakeholder analyses (including a Mendelow's matrix and onion diagram) and a rich picture. A conclusion was drawn in each step, which was used as a basis for the next analysis. All analyses were adjusted and edited during the whole span project, as new insights and perspectives were added. The following paragraphs are dedicated to the four different analyses and contain the approach, result and conclusion that could be drawn from it. In the final paragraph of the network analysis the overall conclusion is written down. See also Figure 3 for the overview of the different analysis.

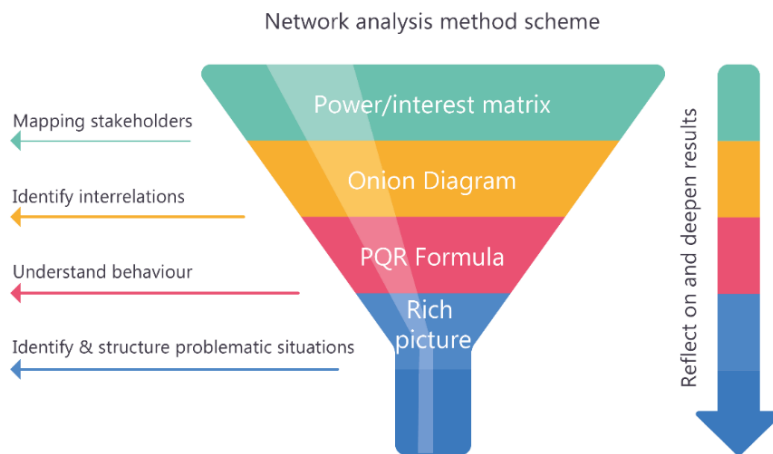


Figure 3 - Network analysis method scheme

2.3 POWER/INTEREST MATRIX

The objective of the first analysis, the power/interest-matrix (or Mendelow's matrix), is to map the different stakeholders in the three networks as previously described in the network analysis approach and give structure to the extensive list of stakeholders.

2.3.1 Approach Power/interest matrix

Stakeholders in this analysis were selected with desk research into publicly accessible protocols of for example flood risk management, expert interviews and websites of involved stakeholders. The stakeholders were then put into two different lists, one for the Polder2C's network and one for the Flood Risk Management and Communication network. The third network (local citizens and inhabitants) was then adopted into both lists. The inherent relation between the two networks and the network of local citizens and inhabitants already showed the existing interrelations between the networks, making it more logical to intertwine these networks from the beginning of the network analysis.

An initial selection for the Polder2C's network was made by choosing to not analyse most of the observing partners, as they are, as their relation with Polder2C's already states, mostly observing. Because this is the first step in the network analysis, the stakeholders were initially categorized on the scale at which they operate, namely transnational, national, regional, local. However for the Polder2C's network, research institutes and businesses were added as two additional categories. Stakeholders were then described according to several aspects, among which the themes they work with, examples of projects they are involved in, interests and tasks. These aspects describe the general nature of the stakeholder. After this, the power and interest of the stakeholders, in relation to flood risk management (FRM) in Zeeland, was described and scored either high or low. The power and interest aspects thus give insight into the perspective of stakeholders on this specific aspect. The aspect of FRM in Zeeland was chosen because this is the aspect that connects all three networks with each other and our research. The analyses of the stakeholders can be found in chapter five of the Appendices Document.

2.3.2 Results Power/interest matrix

Power and interest scores were summarised in two matrixes, one for the Polder2C's network and one for the flood risk management and communication network. The two matrixes give a clear overview of the scale of involvement in FRM in Zeeland of the stakeholders in the three networks, while more explanation on specific stakeholders can be found in the specific stakeholder tables.

Table 1 - Power/Interest Matrix – Polder2Cs

Power	<u>High Power/Low interest</u>	<u>High power/High Interest</u>
	<ul style="list-style-type: none"> • European Territorial Cooperation – Interreg 2 seas 	<ul style="list-style-type: none"> • Ministerie van Defensie (MinDef) • Rijkswaterstaat (RWS) • Waterboard Scheldestromen (WSS) • Vlaams-Nederlandse Scheldec commissie (VNSC) • TU Delft • HZ University of Applied Sciences • STOWA
	<u>Low Power/ Low Interest</u>	<u>Low Power/ High Interest</u>
	<ul style="list-style-type: none"> • European Regional Development Fund (ERDF) • Environment Agency UK • Cerema • Streekholders Grenspark Saefthinghe • Université de Lille • South West Water • ISL Ingénierie 	<ul style="list-style-type: none"> • Flemish Department of Mobility and Public Works (MOW) • Province of Zeeland • Sigmaplan • Gemeente Hulst • Farmers / Agriculture professionals • KU Leuven • Inhabitants of Hulst
	Interest	

Table 2 - Power/Interest Matrix – Flood Risk Management & Communication

Power	<u>High Power/Low interest</u>	<u>High power/High Interest</u>
		<ul style="list-style-type: none"> • Koninklijk Nederlands Meteorologisch Instituut (KNMI) • Watermanagement Centrum Nederland, Landelijke Coördinatiecommissie Overstromingsdreiging (WMCN-LCO) • Departementaal Coördinatiecentrum Crisisbeheersing, Ministerie van Infrastructuur en Waterstaat (DCC-IenW) • Rijkswaterstaat Verkeer- en Watermanagement (RWS-VWM) • Waterschap Scheldestromen (WSS) • Ministerie van Defensie (MinDef) • Nationale Coördinator Terrorismebestrijding en Veiligheid (NCTV) • Nationaal Crisis Centrum (NCC) • Rijkswaterstaat Zee en Delta (RWS Zee en Delta) • Veiligheidsregio Zeeland • Watermanagement Centrum Nederland, afdeling Kust (WMCN-Kust)
	<u>Low Power/ Low Interest</u>	<u>Low Power/ High Interest</u>
		<ul style="list-style-type: none"> • Unie van Waterschappen • Hydrologisch Informatiecentrum (HIC) • Provincie Zeeland • Gemeente Hulst • Farmers / Agriculture professionals • Local inhabitants Hulst • First responders (fire department, police, hospitals)
	Interest	

2.3.3 Conclusion Power/interest matrix

The Polder2C's matrix has an equal amount of stakeholders in the high/high, low/high and low/low quadrants but only one stakeholder in the high/low quadrant. This shows that there are

stakeholders which are directly involved in both the Living Lab as well as the relevant aspect of FRM in Zeeland, but also stakeholders which aren't involved directly but do have an interest in FRM in Zeeland. This last quadrant (low/high) consists mostly of local or regional stakeholders with no large part in the FRM structure but have a high interest nonetheless because of their location. The low/low quadrant mostly consists of stakeholders which do not have the geographical link to Zeeland or similarities with FRM in their field of work.

The flood risk management and communication matrix only has stakeholders in the high/high or low/high quadrant which can be explained by the similarity between their network and the relevant aspect of FRM in Zeeland to which the power/interest scores were given. The difference between the two quadrants which do have stakeholders in them mostly comes down to the level of direct involvement in the FRM structure. Stakeholders with a role which is more on the background or is not as influential to the FRM protocols for example, are in the low/high quadrant. While direct/important members of the FRM structure received a high/high score.

2.4 ONION DIAGRAM

To identify interrelations between stakeholders in regards of flood risk management in Zeeland, the Onion Diagram analysis was set up.

2.4.1 Approach Onion diagram

Elements/actors were selected based on the results from power/interest matrixes. Actors in the high power/high interest quadrants were selected as **key players** in FRM in Zeeland. Actors with low power/high interest quadrants were selected as **primary stakeholders** while actors in High power/low interest in Flood risk management and communication matrix were selected as **secondary stakeholders**. The reason behind selecting the low power/high interest quadrant as the primary stakeholder is, the presence of stakeholders who are directly affected, either positively or negatively, by FRM strategies. The reason behind selecting the high power/low interest quadrant as the secondary stakeholder is, the presence of stakeholders who are not directly affected by FRM strategies. Stakeholders in the low power/low interest were not included in this analysis since they have a lesser impact or interest on FRM in Zeeland.

Table 3 - Key Players

Stakeholder	Abbreviation	Stakeholder	Abbreviation
Ministerie van Defensie	MinDef	Rijkswaterstaat	RWS
Watermanagement Centrum Nederland, Landelijke Coördinatiecommissie Overstromingsdreiging	WMCN-LCO	Departementaal Coördinatiecentrum Crisisbeheersing, Ministerie van Infrastructuur en Waterstaat	DCC-IenW
Waterschap Scheldestromen	WSS	TU Delft	-
Vlaams-Nederlandse Scheldecommissie	VNSC	Veiligheidsregio Zeeland	-
Rijkswaterstaat Verkeer- en Watermanagement	RWS-VWM	Nationale Coördinator Terrorismebestrijding en Veiligheid	NCTV
HZ University of Applied Sciences	HZ	National Crisis Centre	NCC
STOWA		Rijkswaterstaat Zee en Delta	RWS-Zee en Delta

Koninklijk Nederlands Meteorologisch Instituut	KNMI	Watermanagement Centrum Nederland, afdeling Kust	WMCN-Kust
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Table 4 - Primary Stakeholders

Stakeholder	Abbreviation	Stakeholder	Abbreviation
Flemish Department of Mobility and Public Works	MOW	First respondents(Fire department, police, hospitals)	First responders
Unie van Waterschappen	-	Farmers/ Agriculture professionals	Agriculturalists
Hydrologisch Informatiecentrum	HIC	KU Leuven	-
Provincie Zeeland	-	Local Inhabitants In Hulst	Inhabitants
Sigmaplan		Gemeente Hulst	-

Table 5 - Secondary stakeholders

Stakeholder	Abbreviation
European Territorial Cooperation – Interreg 2 seas	Interreg 2 Seas

The stakeholders are divided in three sections, state, civil society and research institutes, as seen in Figure 4. The connection has been made according to the data gathered from Polder2Cs network analysis, information from the interviews, literature review and the PQR analysis data. Yellow lines indicate connection between FRM network and white dotted lines indicate the interrelations between Polder2cs network. The stakeholders which were analysed using the PQR method is shown with light blue colour.

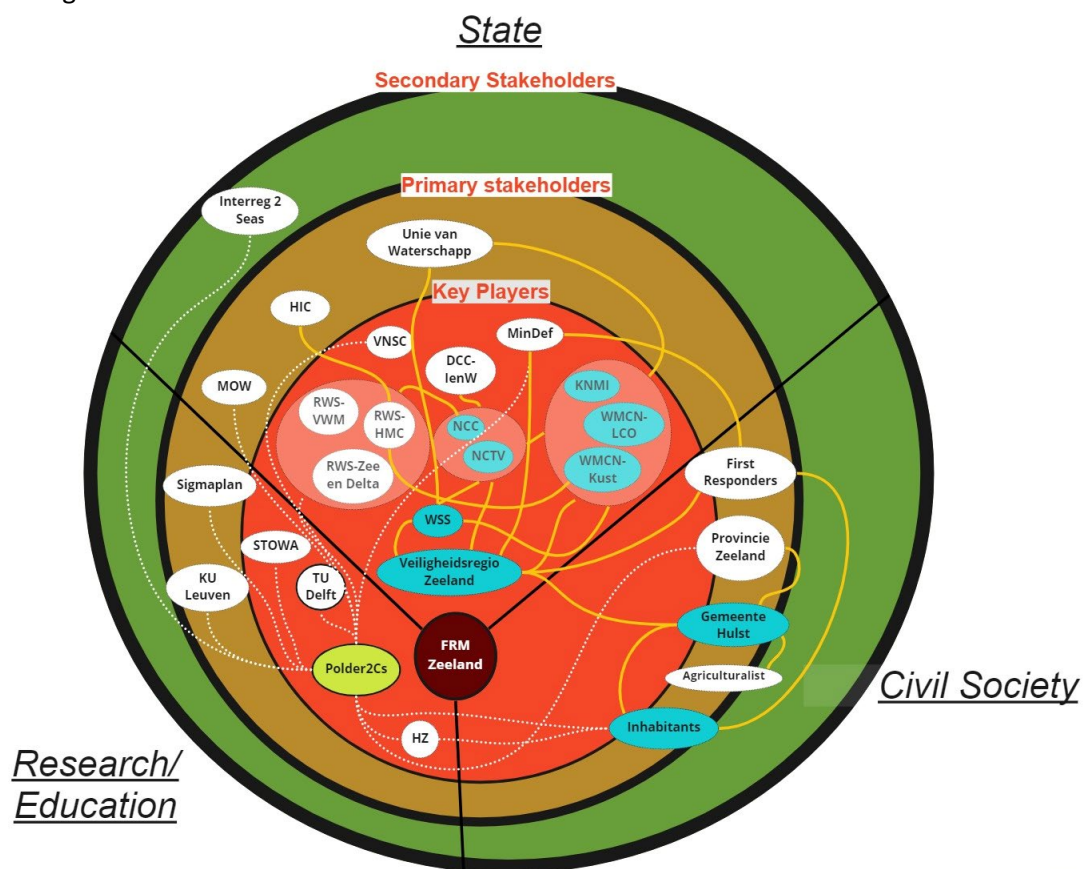


Figure 4 - Onion Diagram Analysis

2.4.2 Conclusion of the Onion diagram

Following the visualization of the onion diagram, we have a clear idea of how the stakeholders are linked within their network as well as with other networks. The stakeholders which had a complex role were subjected to a PQR analysis in a given crisis scenario in order to understand their behaviour when it comes to decision making and communication. Furthermore, the diagram gives a clear idea on the position of the Poder2Cs and how it connects with different networks with different perspectives.

2.5 PQR FORMULA

The PQR formula is a part of Soft Systems methodology (SSM) which can be used to express a root definition, a statement written in few sentences to capture one's worldview in a particular matter. (Expertise, n.d.)

2.5.1 Approach PQR formula

This formula can be used in any situation thus, in this network analysis it was used to analyse and understand the behaviour of actors/stakeholders in flood risk management to understand their perspective and then relate them to the aspect of flood risk management in Zeeland. As starting point, a crisis communication tree was created. This serves as a basic and simple to understand overview, but also created the ability to find the place where all the different PQR analysis would be in the crisis communication path. This tree can be found in chapter 6 of the Appendices Document.

Scenario: Imminent flood with not enough warning time for preventative evacuation. Government advises not to leave the area and find shelter on a high floor in their house or another building nearby (vertical evacuation).

Above scenario was used to substantiate actors who are involved in the situation and the PQR method was used to analyse their perspective, interrelations and behaviour during an imminent flood threat in Zeeland. Further, the findings of the PQR analysis were also used to create and understand connection in onion diagram analysis as well. The following stakeholders were analysed as PQR trees:

- Waterschap Zeeland (WSS)
- Veiligheidsregio Zeeland
- WMCN-Kust/HMC/KNMI
- NCC/NCTV
- Gemeente Hulst
- Local Inhabitants of Hulst

The PQR trees can be found in chapter 6 of the Appendices Document.

2.5.2 Conclusion PQR formula

The PQR analysis clearly showed some parties having to manage with multiple crisis teams or other organizations to be able to fulfill their main and sub activities. This creates a complex network that can differ from local scale to national or even international scale.

Because of the amount and importance of the communication lines it is vital that procedures during crisis situations are known and used to ensure the main goal "safeguard the lives in danger" is met. Organizations need to be aware of who they need to inform, when they need to do this and in what way. LCMS is seen to being an important tool for this interorganizational communication.

2.6 RICH PICTURE

The foundation for the rich picture lies in soft systems methodology (SSM), which is used to identify and structure problematic situations in such a way that is meaningful to the stakeholders in that system ((Reynolds & Holwell, 2010)). The picture showcases three major components in a network: its structure, its internal process, and the concerns of primary stakeholders (Monk & Howard, 1998). The interviews with Bart Vonk, Richard Rozemeijer and Marcel Matthijse were the input of the rich picture.

Structure. The foundation; major stakeholders that make up the network, often presented in a hierarchical way. The structure usually responds slowly to change. The analyst is also represented in the structure, since they have their own viewpoint.

Process. This is indicative of the transformations that occur within the network. This can be a flow of communication or information.

Concerns. Issues and motivations of individual stakeholders. These may be the most important components of the rich picture. Conflicting concerns cause bottlenecks and tensions in the network.

2.6.1 Approach rich picture

The rich picture includes the major stakeholders, not individually listed but clustered under thematic ‘umbrellas’, that represent several components of the network. In the yellow shapes, the concerns are specified for each stakeholder, based on the process-trees presented in the PQR-analysis.



Figure 5 - Rich picture of the Flood Risk Information Experiment Polder2C's

2.6.2 Conclusion rich picture

The rich picture (Figure 5) provides a clear overview of the extent of the network in which FRIEP locates itself, as well as its own position within said network. The picture includes the thematic scope in which the most influential and powerful stakeholders (see Medelow's matrix analysis) are situated:

- Research
- Local inhabitants
- Prevention and maintenance
- Crisis and risk communication
- Crisis management

Simultaneously, five corresponding concerns or bottlenecks were defined that are currently at stake:

- Support (for evacuation strategies)
- Low risk perception
- (Emphasis on) flood prevention strategy
- Third generation effect
- Evacuation behaviour (information gap)

The picture can serve as a reference tool to use in decision-making throughout the development of the documentary (storyline, editing process) and other products for the experiment. It can also be used to spark a conversation among stakeholders, or to separate main issues from minor ones.

2.7 CONCLUSION NETWORK ANALYSIS

The network analysis was conducted to gain a better understanding of the position of this project in these three networks and function as a decision-making tool to decide on the relevancy of information and resources. It also shows the interrelations, provides insight into behaviour of stakeholders and reveals conflicting interests or bottlenecks. It may also help potential follow-up studies that aim to improve communication strategies for emergency management or about the perception of flood risk communication among inhabitants.

The first analysis, where the stakeholders were put into the power/interest matrix, a quick overview was provided of the three (overlapping) networks where the FRIEP is positioned within. From this matrix the actors for the Onion Diagram analysis were selected. Actors in the high power/high interest quadrants were selected as key players in FRM in Zeeland. Actors with low power/high interest quadrants were selected as primary stakeholders while actors in High power/ low interest in Flood risk management and communication matrix were selected as secondary stakeholders.

Following the visualization of the Onion Diagram, there is now a clear idea of how the stakeholders are linked within their network as well as with other networks. The stakeholders which had a complex role in FRM in Zeeland were subjected to a PQR analysis in a given crisis scenario in order to understand their behaviour when it comes to decision making and communication. Furthermore, the diagram gives a clear idea on the position of the Poder2Cs and how it connects with different networks with different perspectives.

The PQR analysis clearly showed some parties have to deal with multiple crisis teams or other organizations to be able to fulfil their main and sub activities. This creates a complex network that can differ from local scale to national or even international scale. Because of the great number of and importance of the communication lines, it is vital that procedures during crisis situations are known and used to ensure the main goal “safeguard the lives in danger” is met. Organizations need to be aware of who they need to inform, when they need to do this and in what way.

This also counts for the communication of the FRM in Zeeland (and in the Netherlands) towards the local inhabitants in case of an imminent flood. This is why the last step of the network analysis is the rich picture in which three major components in a network are showcased: its structure, its internal process, and the concerns of primary stakeholders. It also provides a clear overview of the extent of the network in which FRIEP locates itself, as well as its own position within said network.

In the picture five main corresponding concerns or bottlenecks were defined that are currently at stake:

- Support (for evacuation strategies)
- Low risk perception
- (Emphasis on) flood prevention strategy
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The picture can serve as a reference tool to use in decision-making throughout the development of the documentary (storyline, editing process) and other products for the experiment. It can also be used to spark a conversation among stakeholders, or to separate main issues from minor ones.

The network analysis shows a discrepancy between a highly controlled, complex and technologically advanced disciplinary field of water safety and crisis management on the one hand, and a general unawareness among the group of local inhabitants. It is in this exact knowledge gap that FRIEP positions itself.

3 DOCUMENTARY

3.1 GOAL

Following the problem statement [3.2], the documentary has the intention to lower risk perception and increase the belief in self-efficacy for vertical evacuation strategies. The opposite is desired for the option 'fleeing': (increase feelings of fear and 'limit' confidence). A positive effect on flood awareness is also intended.

3.2 CONCEPTUAL FRAMEWORK

The conceptual framework draws on both participatory film-making theory and risk perception theory.

Risk perception

According to (Kievik & Gutteling, 2011), citizens' behaviour towards taking self-protective measures is determined by two factors: the level of flood risk perception (high vs low) and the belief in self-efficacy (high vs low). Self-protective measures can be recognized as 1). information-seeking behaviour (education) and 2). engagement in self-protective measures (concrete preparations for an actual flood-situation).

Research has shown that risk perception and the consequent motivation to prepare for a flood scenario is typically low among Dutch citizens (Terpstra T. , 2011), despite attempts from the government to raise awareness and promote self-protective action. "Understanding perceptions and trade-offs regarding evacuation is important for risk communication that aims to increase risk awareness and provide action perspective in when a flood threatens." (Terpstra & Buijs, 2020).

Participatory film-making

Within social science, participatory film-making has caught increasing interest as a 'practice as research' method for social change (Goris, Witteveen, & Lie, 2015). Participatory film-making requires finding a balance between three different roles: film-maker, facilitator and researcher. They have different concerns: the film-maker guards artistic qualities, the facilitator values participation and creating room for change. The researcher is concerned with the quality of the intervention and research results.

Aside from the film-makers/facilitators/researchers, the article marks community members as the problem owners, i.e. the stakeholders in the project who collaborate to create this space for change. Contributing to this aim, the authors refer to social learning, network building and dealing with dynamics of power and conflict.

Furthermore, the paper acknowledges the space for change is in the process of film-making, but also in the process of viewing by the target audience.

3.3 APPROACH

Following the conceptual framework on risk analysis, the documentary aims to respond to both risk perception and efficacy belief by showcasing 1. the extent of flood risk management that happens 'behind the scenes' and 2. the extent of a worst-case scenario with an imminent dyke-breach in the area inhabited by the participants of the information experiment.

By showcasing the chain of communication in flood management, from monitoring the water levels to dyke-maintenance and crisis management, the documentary aims to provide a broad insight in the extent of measures taken by different institutions, and simultaneously show where the

unavoidable responsibility of individuals lies. This is meant to gain a nuanced perspective on the actual flood risk and collective level of preparedness.

The worst-case flood scenario is added to trigger the viewer's reflection on self-efficacy. A horizontal evacuation strategy is explained, providing a starting point to reflect on necessities and steps to be taken. Finally, the title of the documentary, 'Als de dijken breken, hoe goed ben jij dan voorbereid?' is also meant to stimulate the individual's thought process on self-efficacy.

It is important to note that the aim is not to provide a step-by-step survival guide for a flood scenario, as this information is available already on existing platforms such as overstroomik.nl. Rather, it aims to stimulate self-empowerment and active information seeking behaviour amongst viewers.

Concerning the conceptual framework on participatory film-making, we intend to approach the documentary in a holistic sense: by adding to the process and taking steps into regard that may enhance the result and impact of the film, such as screentests, network building and social learning.

3.4 STORYLINE DEVELOPMENT

The storyline is built on the intentions described under [2.3. Approach]. These intentions led to a first version of the storyline developed within the team and under supervision of Jean-Marie Buijs and Teun Terpstra. See chapter 8 of the Appendices Document.

This storyline contains a look at several components of the water- and crisis management system through interviews with experts, an animation showcasing the dyke breach scenario described under [1.3 Scenario], a testimony of someone who had experienced the Meuse-floodings in Juli 2021, as well as a short overview of relevant sources.

We then invited several water- and crisis management experts to reflect on and adjust the storyline in an early stage of the development of the intervention. This took place during a series of individual semi-structured online interviews in late October. See chapter one to four of the Appendices Document.

The interviews served several purposes:

- Gaining input and remarks on the first proposal of the storyline
- Broadening our knowledge of the functioning of the water safety and crisis management system
- Enhancing the network analysis
- investigate the potential use of the interviewees for the actual documentary.

The interviewees were selected based on their expertise and/or their involvement in the Living Lab Polder2Cs.

Overview initial interviews

Date	Name	Expertise
27-10-2021	Rutger Blok	Senior advisor Hydro Meteo Centrum
27-10-2021	Marcel Matthijsse	Policy advisor Safety Region Zeeland
28-10-2021	Richard Rozemeijer	Project leader Streekholders, Province of Zeeland
15-11-2021	Bart Vonk	Coordinator Polder2cs & Senior advisor watersafety, Rijkswaterstaat
29-11-2021	Angelo De Bruijn	Coordinator Maintenance and Operating, Waterboard Scheldestromen
29-11-2021	Jan van Kranenburg	Policymaker crisismanagement, Waterboard Scheldestromen

The initial interviews led to alterations in the storyboard, resulting in a second version, see chapter 9 of the Appendices Document. Most remarkable choice that was made, based in the input we gained from the experts, was leaving out the testimony from someone who had experienced the Meuse-flooding, because it was feared that the context being different (flood from the river rather than the sea) would cause confusion and not appeal to the local inhabitants of Kloosterzande.

3.4.1 Scenario development

The scenario as described in paragraph 1.2 Scenario, was catered to influencing the level of flood risk perception (high vs low) and the belief in self-efficacy (high vs low) in an optimal manor. It was paramount that the scenario enlarges the level of flood risk perception, without causing too much feelings of fear, as this would negatively influence the belief in self-efficacy. Low self-efficacy beliefs, as described in 3.2 Conceptual framework, lower citizens intention of taking self-protective measures which is something the research wants to prevent. (Kievik & Gutteling, 2011)

The scenario was initially designed to have dike breaches near Kloosterzande, similar to the final version as described in paragraph 1.2 Scenario. However, the first version of the flood scenario was sought out for the highest flood level available when looking at breaches near Kloosterzande. This resulted in a scenario mentioning flood levels of 4.5 meters. These high flood levels however only occurred in agricultural polders and were not representative of the flooding experience most inhabitants of the region would come up against. Adding onto the not being representative, the high flood levels were also thought to negatively influence the belief in self-efficacy.

After consultation with both our supervisor as well as Marcel Matthijsse, an improved version of the scenario was developed with slightly different dike breaches and with more emphasis on the mean flood level occurring in the village centres. This resulted in a scenario which mentions that most inhabitants would face a flood level of up to 1 meter. This flood level is thought to be a level where the scenario works for enlarging the flood risk perception among inhabitants without compromising the self-efficacy beliefs.

3.5 INTERVIEWS

Structured interviews were carried out with three experts to gather knowledge on what's happening behind the scenes in terms of flood risk management in Zeeland. The interviews were recorded for use in the documentary. Questions were structured and tailormade as per the interviewee to gain knowledge regarding the role in crisis management of that expert and the organisation they represent in both cold and warm phases. The interview details as follows. The transcriptions of the interviews can be found in here. See chapter 10 to 12 of the Appendices Document.

Date	Name	Expertise
11-11-2021	Rutger Blok	Senior advisor Hydro Meteo Centrum
23-11-2021	Marcel Matthijsse	Policy advisor Safety Region Zeeland
03-12-2021	Jan van Kranenburg	Policy officer for crisis management at Waterschap Scheldestromen

3.6 EDITING PROCESS

3.6.1 Monitoring and adapting strategy

Poor quality of the documentary could interfere with measuring the effect of the documentary while showing it to participants of the experiment. The development of the documentary thus followed a

continuous iterative process of quality control. This was done to make the film as effective as possible in reaching its aim and to extract all the potential out of the information experiment. This iterative editing process involves monitoring and adapting as two essential steps and is described according to the continuous improvement PDCA-concept. This method contains four repeating steps (Plan, Do, Check, Act) and gives structure to the editing process while also providing room for directing the process towards specifically set goals. The following PDCA's guide the editing process towards a conclusion concerning the documentary in itself and the use of this medium in flood risk communication. (Sokovic, Pavletic, & Kern Pipan, 2010)

PDCA 1: Developing (monitoring)

- Plan: Develop applied knowledge on the feasibility of a documentary as a communication tool for flood risk communication.
- Do: Make a documentary showing the elaborate process of forming an evacuation advice, the dangers of not following said advice and providing an accurate image of the emergency situation.
- Check: Monitoring the artistic qualities mentioned in the monitoring approach.
 - o Checking the form, content, and message according to the following parameters:
 - Relevancy, appropriateness, credibility, wholeness, coherence, appeal, production quality and message.
- Act: Process the screentest feedback into the documentary before the experiment.

PDCA 2: Maximising (monitoring & adapting)

- Plan: Maximising the impact of the received feedback from the monitoring moments and reducing the chance of receiving the same issues as feedback in following feedback rounds.
- Do: Identify and fix other examples of specific issues which come forward in the screentest.
- Check: Explore the suggestions for the documentary and try to identify if these are recurring issues.
- Act: Process the additional fixes into the documentary before the experiment.

PDCA 3: Improving (adapting)

- Plan: Improve the quality of the documentary to generate a larger effect among people watching the film.
- Do: Process the monitoring feedback into the documentary.
- Check: Looking into the most important feedback given in previous monitoring rounds during the 3rd monitoring and determine whether the adaptation had been completed.
- Act: Collect knowledge on the artistic qualities from the feedback rounds and add this to the communication support for professionals in emergency management. This prevents similar mistakes occurring in the future (advise on general improvements)

PDCA 4: Advise

- Plan: Support professionals in emergency management by developing applied knowledge on the feasibility of a documentary as a communication tool for flood risk communication. Prevent similar mistakes in similar projects in the future.
- Do: Process the received feedback in the advice given to emergency management professionals.
- Check: Examine which issues out of the feedback rounds are relevant for professionals.
- Act: Advise emergency management professionals.

3.6.2 Monitoring

3.6.2.1 Approach

The parameters being monitored while developing the documentary are based on the artistic qualities mentioned in the reflective paper *Participatory film-making for social change: Dilemmas in balancing participatory and artistic qualities* (Goris et al, 2015). In this paper, both a literature review as well as three exemplary projects value a number of qualities that prove essential for an impactful intervention, i.e. creating space for achieving social change. They are listed below:

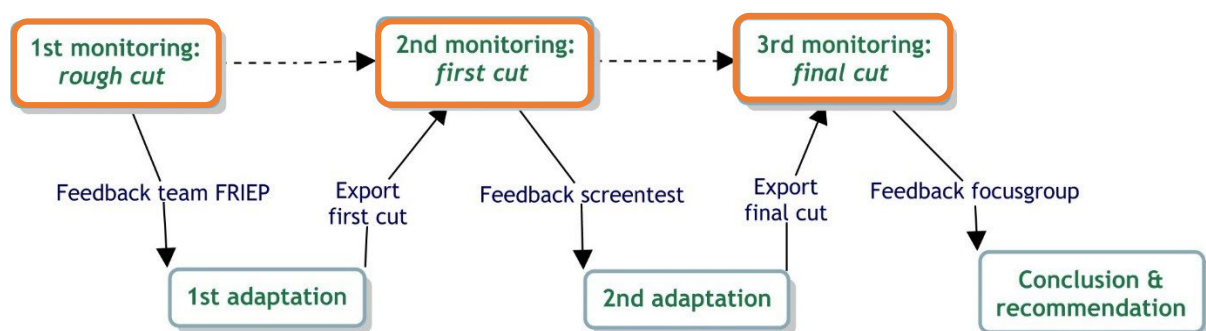
- (1) relevancy
- (2) appropriateness
- (3) credibility
- (4) wholeness
- (5) coherence
- (6) appeal

Furthermore, the paper stresses the need for a good **(7) production quality** to articulate the seriousness of the case and elevate individual narratives to a collective issue.

Abovementioned artistic qualities are central in the monitoring strategy. Additionally, specific emphasis was put on the viewers' perception of the **(8) message**.

3.6.2.2 Monitoring timeline

The strategy consisted of three monitoring moments during the process when the artistic qualities of the documentary were being monitored:



1st monitoring moment

Edit version: rough cut

Audience: 8 (team + supervisors)

Data: common feedback document

Artistic qualities checked: appropriateness, credibility, wholeness, message,

Evidence: Chapter 13 of the Appendices Document.

The first feedback moment took place on Friday the 10th of December, 2021. This was the point where the documentary was put together according to the storyline, i.e. all scenes were included and put in consecutive order, but no audio mastering and coloring had taken place. The intention of this first monitoring was to check whether the storyline met the set of artistic qualities defined in the approach. The screening took place internally and collectively within the team. Jean-Marie Buijs and Teun Terpstra furthermore added feedback through email. This resulted in a list of adjustments, which were then separated in 'priorities' and 'feasibilities', which formed the basis for the first adaptation, resulting in the *first cut*.

2nd monitoring moment

Edit version: first cut

Audience: 22 (informal network)

Data: Screentest survey results

Artistic qualities checked: appropriateness, credibility, wholeness, message, coherence, appeal, production quality, message

Evidence: Chapter 14 of the Appendices Document.

The second monitoring took place between December 17th 2021 and January 3rd, 2022, in the shape of an online accessible screentest, spread amongst an informal network of acquaintances of the FRIEP team, as well as students, supervisors, tutors and a number of water- and communication professionals.

For the screentest, a survey was developed addressing the set of core artistic qualities, in a broad sense. Data was collected through both quantitative and qualitative questions, and analyzed accordingly. The results were once again organized by priority, and consequently processed during the 2nd adaptation, leading to the final cut that would be used in the information experiment.

3rd monitoring moment

Edit version: final cut

Audience: 19 (inhabitants of Kloosterzande)

Data: common feedback document

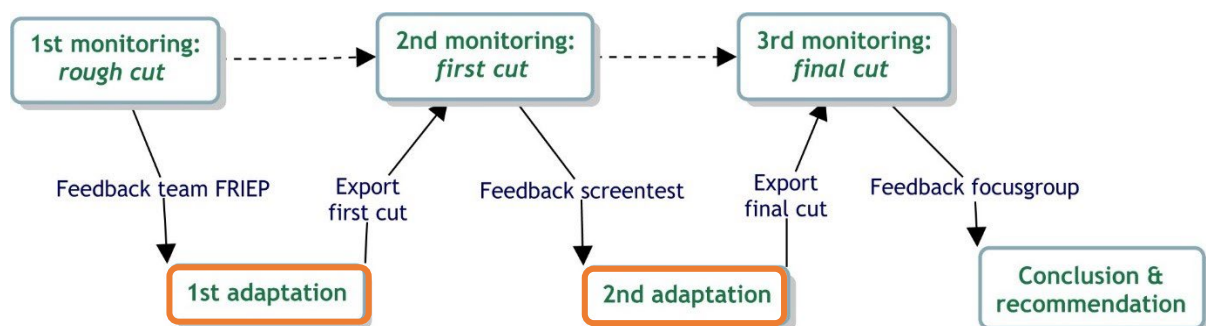
Artistic qualities checked: relevancy, appropriateness, credibility, wholeness, coherence, appeal, production quality, message

Evidence: Chapter 15 of the Appendices Document.

The third monitoring took place on January 10th and 13th, 2022, during the focus group sessions. Both the survey and the discussion paid attention to the core set of artistic qualities that are central in the monitoring strategy, although the focus was limited on the main priorities (and subsequent adaptations) defined in the 2nd monitoring. This monitoring served as a final check, to determine to which extent the final adaptation had been successful.

3.6.3 Adapting

Two adaptations were carried out in between three monitoring sessions. Feedback from the monitoring moments was analysed and prioritized in order to distinguish the most relevant remarks from remarks that were considered less relevant or too particular (personal taste). Prioritizing was done based on a 3 point Likert scale, where 1 = main priority, 2 = desirable priority & 3 = not a priority/not relevant for adjustment purposes. Feedback remarks were further prioritized based on the number of times it was mentioned. If a remark occurred more than one time, it was automatically given a '1' priority. Results of the 3rd monitoring analysis were analysed and processed in a final conclusion that can be used for future endeavours.



First adaptation

Edit version: rough cut

Characteristic of adaptation: primarily technical

Evidence: Videofile 20211224_FIRST_CUT

The first adaptation can be considered a minor one, since it mainly involved technical adjustments and small details, such as adding the correct logo's. The storyline was considered to sufficiently match all of the artistic qualities mentioned under [3.2.6.1. Approach]. A discussion evolved around a particular sentence from the voice-over, stating that 'the waterlevels can be as high as four meter'. This was considered too extreme, provoking too much fear and at risk of being considered less realistic by the viewer. Based on data from LIWO-maps, we decided to use the more likely water level of two meter.

All remarks from the first monitoring were taken into account, resulting in the first cut of the documentary that was used during the screentest.

Second adaptation

Edit version: first cut

Characteristic of adaptation: primarily content-wise

Evidence: Videofile 20220126_FRIEP_FINAL_CUT and Chapter 16 of the appendices document

The second adaptation could draw on a generous amount of feedback provided through the second monitoring / screentest. The second adaptation was therefore more drastic, compared to the first adaptation. It involved a critical revision of the entire storyline. Major adjustments were made in the text selection used for the final cut. These were all motivated changes based on the feedback remarks marked as (1) highest priority (see Appendice chapter 16). However, although considered as (2) feasible, not all monitoring results could be taken into account, due to limited time and resources. We were not able to conduct, as suggested, additional interviews with local inhabitants or the mayor of Hulst, or develop infographics to support the information that was communicated in the interviews.

Additionally, the second adaptation involved adjustments made in the animation. Two major changes consisted of editing the animated floodmap showcasing the tidal effect and elevating the waterlevel in Noah's house to reach approximately two meters (in the first cut, the waterlevel was very modest) and match the description from overstroomik.nl. Furthermore, we decided to use the yellow typology from 'NL alert' and the soundscape from the Dutch alarm sirens instead of a regular alarm sound and symbol, to embed the realistic scenario more in the animation.

The adjustments in the animation were outsourced and closely discussed with our animator Chris Tekent.

3.6.4 Subconclusions monitoring and adapting

First monitoring moment

The intention of this first monitoring was to check whether the storyline met the set of artistic qualities defined in the approach.

In general, the feedback session was useful to finalize the name of the documentary, agree on the storyline for the first cut and create a correction list for the animation and the voice-over.

There were no remarks on the storyline in general. The information selected for the rough cut was considered complete and relevant by the team.

Priority was given to the remarks related to the sound design, coloring, the animation and the voice-over.

First adaptation

The goal of the first adaptation was to reflect on the first monitoring results and incorporate as much of the relevant feedback as possible, leading to an optimised first cut version.

Due to the majority of feedback suggestions being of technical nature, all could be honoured, leading to an improved product for the screentest.

Second monitoring moment

The intention of this first monitoring was to check whether the first cut of the documentary met the set of artistic qualities defined in the approach.

Firstly, it was noticed that the 22 participants who contributed with feedbacks are equally divided in terms of gender and age varied between 20 and 64. The analysis was done in 4 main categories, namely general impression, content and structure, animation and production quality.

Based on the received feedback, qualitative remarks based on the content and structure received relatively more remarks with priority 1 and priority 2 compared other sections. Majority of the quantitative analysis remarks received a positive feedback while, animation and production quality sections show priority 3 for its artistic qualities. Some of the written critics had to be neglected due to personal preferences or unfeasibility to make adaptations.

A more detailed look into the data received during this screentest can be found in chapter 14 of the Appendices Document.

Second adaptation

The goal of the second adaptation was to reflect on the second monitoring results and incorporate as much of the relevant feedback as possible, leading to an optimal, feasible and relevant final cut.

Most of the relevant feedback could be honoured, leading to slight, motivated alterations in the storyline. Some feedback was dismissed due to limitations in time and resources.

Third monitoring moment

The intention of the 3rd monitoring moment was to determine if the final adaptation had been successful. This would mean that remarks mentioned during previous monitoring moments does not return in this monitoring moment.

In the 2nd monitoring, a few main priorities stood out from the rest. Mainly the content and structure of the documentary but also the general impression of the documentary got the most feedback. The 3rd monitoring moment therefore had a focus on these issues and showed that the adaptations (2nd adaptation) to the documentary in between the 2nd and 3rd monitoring moment were successful. There were still several qualitative remarks given which received a high priority but given the small difference in number of respondents (19 vs. 22) the number of remarks with a high priority has dropped significantly. Looking at specific remarks of the 2nd monitoring recurring in the 3rd monitoring, only the first remark from the focus groups, about adding more information about preparing vertical evacuation, comes back during the final monitoring.

3.6.5 Conclusion monitoring and adapting

Overall, the monitoring strategy proved its worth with the number of useful remarks received. The first monitoring moment served as a moment to clean up the most obvious blemishes in the

documentary. The choice to do this monitoring on the rough cut of the film made for an efficient improvement step to the first real cut.

The nature of the monitoring moment and the quality and quantity of the corresponding feedback had a direct impact on the severity of the adaptation. Where the first monitoring session only led to technical adjustments, the screentest provided a generous amount of relevant feedback leading to slight alterations in the storyline. The method used for monitoring, i.e. the way in which feedback is gathered, therefore directly impacts the following adaptation.

One conclusion that can be made is that it was valuable to monitor the documentary with different groups of stakeholders. The respondents to the screentest and the experiment brought in not only a fresh pair of eyes to prevent getting blinded by looking at the documentary for too long, but also brought in new perspectives. One example of this is the perspective of survivors of the Watersnoodramp of 1953, or more general, the perspective of inhabitants of an area prone to flooding.

Even though the number of remarks dropped following the adaptations made, there was still useful feedback being given in the third monitoring moment. This shows that even with 49 people monitoring the documentary, there will still be new remarks which can be useful in improving the quality of the documentary.

Not all remarks were as useful for improving the documentary. Some of the remarks contained strong personal opinions or contained valuable tips but were not within our reach to adopt into the documentary. Limited time available for adaptations was the main cause of not being able to adopt all the valuable remarks. Prioritizing feedback brought structure into the long list of remarks gained during the three monitoring moments. There were also specific remarks that were mentioned several times, which helped with prioritizing some remarks over others. The number of times a remark was mentioned was therefore a useful factor to keep track of.

4 INFORMATION EXPERIMENT

4.1 PROBLEM STATEMENT

As stated in the introduction, the HZ project group Resilient Deltas aims to design and test an information experiment in the form of a documentary to develop applied knowledge about how inhabitants perceive flood risk communication and how this can support professionals to improve communication strategies for emergency management. The effects of a documentary as a communication tool on the attitudes of the inhabitants of the municipality of Hulst towards evacuation, their information seeking behaviour and consequential behavioural intentions in case of an imminent flood where preventive evacuation is no longer possible, have not been formerly researched and constitute a knowledge gap for the participating stakeholders of the 'Polder2C's' project. Therefore, the research methodology for an information experiment is developed and presented in this chapter.

As mentioned in 3.2 *Conceptual framework*, citizen's behaviour towards taking self-protective measures is determined by the level of flood risk perception (high vs low) and the belief in self-efficacy (high vs low). The goal of the documentary is to lower the risk perception and increase the belief in self-efficacy for the option towards the option 'shelter on a higher'; 'decreased' feelings of fear and a 'higher' self-confidence should lead to a more positive attitude (higher score) for this option. The opposite is desired for the option 'Fleeing': 'increase' feelings of fear and 'limit' confidence, which result in a more negative attitude. A positive effect on flood awareness is also intended.

4.2 RESEARCH GOAL & QUESTION

The goal of this research part is to find out if a documentary is a feasible and effective intervention tool to use in flood risk communication. This to contribute to the larger goal of reconnecting flood risk management and society. Based on the results of this research, the participating stakeholders in the *Polder2C's* project receive an insight into how inhabitants during the scenario (see 1.2 *Scenario*) perceive flood risk communication, which can support professionals to improve communication strategies for emergency management. The final product of this research is a concise scientific research report aimed at the participating stakeholders in this project.

The central research question that will be answered by this study is:

- *“What are the effects of the documentary as an instrument to influence the flood risk perception among the inhabitants of Kloosterzande and surrounding areas, in case of an imminent flood where preventive evacuation is no longer possible?”*

To be able to answer this main question of this study a number of sub questions are constructed:

- To what extent has the general risk perception changed?
- To what extent has the attitude (fear, trust and self-efficacy) towards the option 'shelter on a higher floor' changed?
- To what extent has the attitude (fear, trust and self-efficacy) towards the option 'shelter in a community centre' changed?
- To what extent has the attitude (fear, trust and self-efficacy) towards the option 'Fleeing' changed?
- To what extent have the intentions changed?

4.3 METHOD

4.3.1 Research design

The research is divided into two parts (also see *Figure 6*):

- The first part is a quantitative approach with a survey carried out among the inhabitants of Kloosterzande and surrounding areas following a combination of the pre-test-post-test study design and the post-test-only control group study design. With this survey the impact of the documentary will be measured.
- The second part is a qualitative approach with focus groups consisting of inhabitants of Kloosterzande and surrounding areas following a *focus group strategy*. With these focus groups insight in the risk perception and support for evacuation strategies amongst the inhabitants Kloosterzande and surrounding areas will be gained.

Both the experimental and control group will fill in the same survey. Both the experimental groups will be asked the same questions during the focus group discussion. The focus group experiment will take place in two separate online group sessions organised via Microsoft Teams. The experimental group will receive the survey two weeks before the session (pre-test) and during the session this group will be exposed to the documentary and fill in the survey again (post-test). The two weeks in between the pre and post-test are necessary to let the survey questions rest in the mind of the participants. This is needed because familiarity this is known to influence the second test. Also known as the reactive effect of the instrument itself. This will not be the case for the control group, they will not be exposed to the documentary and fill in the survey only once (control test). This way it will become possible to compare the outcomes of the pre survey of the experimental group and control group. These outcomes should be as equal as possible, to validate the control group isn't exceptional and the results of the comparison of the pre and post-test of the experimental group are valid. The control group survey is also compared with the post survey. Possible differences between outcomes are likely to be caused by the documentary and shows the effects that the documentary has on the experimental group.

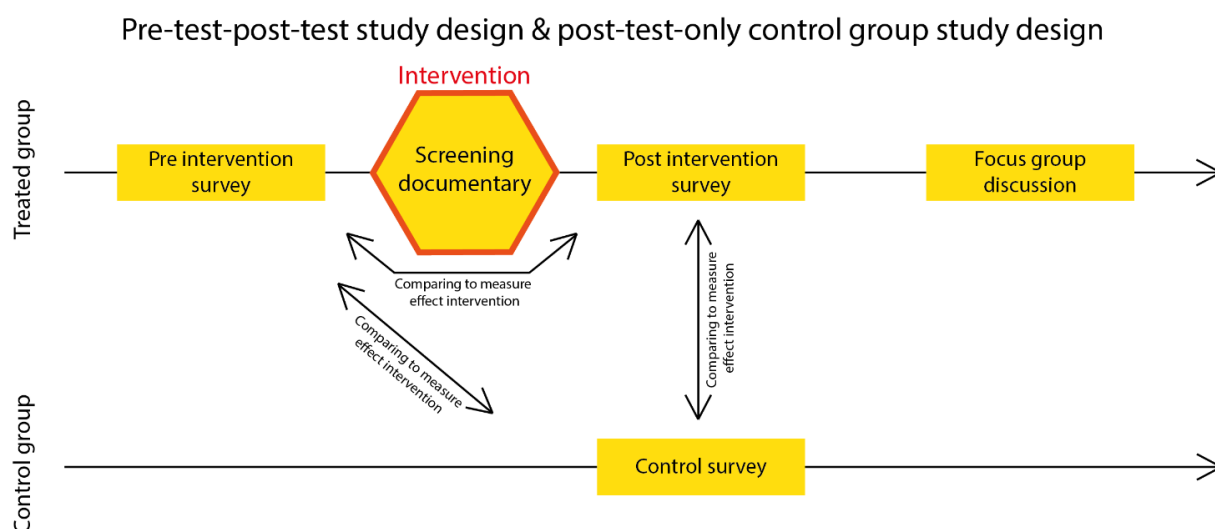


Figure 6 – Research design: Pre-test-post-test study design & post-test-only control group study design

Because the research has an experimental research design, a hypothesis of the main research question needs to be formulated. The following H_0 (no result) and H_1 (desired result) are formulated:
 H_0 : The documentary has no significant effect on the total flood risk perception of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

H₁: The documentary has a significant effect on the total flood risk perception of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

For the sub questions the same is done:

General risk perception:

H₀: The documentary has no significant effect on the general risk perception of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

H₁: The documentary has a significant effect on the general risk perception of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

Shelter higher floor:

H₀: The documentary has no significant effect on the attitude towards the option “shelter on a higher floor” of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

H₁: The documentary has a significant effect on the attitude towards the option “shelter on a higher floor” of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

Community shelter:

H₀: The documentary has no significant effect on the attitude towards the option “shelter in a community centre” of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

H₁: The documentary has a significant effect on the attitude towards the option “shelter in a community centre” of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

Fleeing:

H₀: The documentary has no significant effect on the attitude towards the option “fleeing” of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

H₁: The documentary has a significant effect on the attitude towards the option “fleeing” of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

Intentions:

H₀: The documentary has no significant effect on the intentions of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

H₁: The documentary has a significant effect on the intentions of the inhabitants of Kloosterzande and surrounding areas ($\alpha \leq 0.10$).

4.3.2 Population and sampling

The research subject of this experiment are the inhabitants of Kloosterzande and surrounding areas. The subjects who first registered as participants of the research were automatically assigned to the experimental group. The number of participants first halted at 14 participants and with these participants two experimental focus groups, both containing seven people, were formed. Two people did not participate in the online focus group and were put into the control group.

After the focus groups had taken place, the researchers asked the participants if they could use their network to find people for the control group. From this request 37 new participants joined the research. Because of the preference to make the experimental group and the control group as similar as possible, various control group participants were asked to also join the experimental group. This led to the formation of an experimental group with 23 participants and a control group with 26 participants. For their characteristics, see *Table 6*.

Table 6 - Characteristics of the participants of the experimental and the control group

Characteristics participants	Experimental group		Control group	
Gender	Count	%	Count	%
Man	12	52%	12	46%
Woman	11	48%	14	54%
<i>Total</i>	23	100%	26	100%
Place of residence	Count	%	Count	%
Kloosterzande	13	57%	15	58%
Hengstdijk	2	9%	2	8%
Kruiningen	1	4%	0	0%
Kruispolderhaven	1	4%	0	0%
Ossenisse	1	4%	0	0%
Vogelwaard	2	9%	2	8%
Walsoorden	2	9%	1	4%
Hulst	0	0%	2	8%
Lamswaarde	1	4%	3	12%
Clinge	0	0%	1	4%
<i>Total</i>	23	100%	26	100%
Age (in years)	Sample		Sample	
Range	21-73		20-80	
Average	48,2		43,5	
Std. Deviation	17,2		16,4	
<i>Total</i>	23		26	
Family composition	Count	%	Count	%
Single, no children living at home	3	13%	6	23%
Single, with children living at home	2	9%	1	4%
Married / living together, no children living at home	12	52%	7	27%
Married / living together, with children living at home	6	26%	12	46%
<i>Total</i>	23	100%	26	100%
Dependent on others in daily life	Count	%	Count	%
Not at all	20	87%	24	92%
To some extent	3	13%	2	8%
To a high extent	0	0%	0	0%
<i>Total</i>	23	100%	26	100%
Experience the 1953 flood?	Count	%	Count	%
Yes, personal experience	2	9%	1	4%
No, not experienced	21	91%	25	96%
<i>Total</i>	23	100%	26	100%
Yes, experienced by family or friends	16	70%	15	58%
No, not experienced by family or friends	7	30%	11	42%
<i>Total</i>	23	100%	26	100%
Dry floor	Count	%	Count	%
Probably a safe, dry floor/place in own home	23	100%	24	92%
Probably a not safe, dry floor/place in own home	0	0%	2	8%
<i>Total</i>	23	100%	26	100%

The limited number of subjects causes generalisation for the whole population to be impossible, but the experiment does give an indication whether the documentary is a feasible and effective tool to influence the behaviour of evacuation among the inhabitants of Kloosterzande and surrounding areas in case of an imminent flood when preventive evacuation is no longer possible. A conscious decision was made to limit the sample size to this specific number due to time constraints and the interweaving of the survey with the focus groups so the sessions can stay interactive, but also because of time restraints.

4.3.3 Operationalisation and validity

The inhabitants of the municipality of Hulst are the research subject. This subject has two research characteristics that will be researched in this experiment.

The first research characteristic is the exposure of the documentary. The exposure to the documentary is the independent variable and is of a nominal measurement level: it can be split into 'exposed' / 'not exposed' to the documentary. This will be determined by the focus group the subjects are assigned to: the two experimental groups are exposed to the documentary and the control group is not exposed to the documentary.

The second research characteristic is the risk perception of the research subjects. This characteristic is operationalised by measuring the perceptions with 'multi-item scales' in a survey and focus group, which measures a 'construct', such as 'fear' or 'trust'. In general, 3 items (or more) are needed to measure a construct reliably. The purpose of multi-item scales is to make measured values less dependent on the exact wording of the question and to be able to include several related aspects of a perception. These multi-item scales are already provided by the research of Terpstra and Buijs (2020) and the altered version can be found in chapter 16 of the Appendices Document. The reliability of this survey has already been tested in this previous study using the Cronbach's alpha method, the same approach is repeated during this experiment when the results are collected. Besides this analysis the questionnaire as well as the focus group experiment are developed in intensive consultation with the supervisor and expert.

The same accounts for the overall process, that is discussed in detail and altered multiple times to come to the final method as described in the next chapters. The basis for this research design is setup according to multiple validated sources, such as "research methodology" (Kumar, Research methodology, 2011) "Dit is onderzoek" (Baarda, 2019). Besides that, multiple examples of scientific articles were used in the process.

The risk perception is the dependent variable and is of an interval measurement level: There is an order between the different scores and the interval difference between the scores are equal.

4.3.4 Data collection

The first part of this research consists of a primary sourced, structured, survey-based data collection in which the subjects will collectively fill in the survey. The experimental group will conduct this survey two weeks before and just after they have seen the documentary, the control group will conduct the survey only once during the same period of time by themselves. By conducting quantitative surveys, a first understanding of the risk perception among the subjects can be gained and the results can be compared between the other groups. The survey will use the Likert scale, which is a summated rating scale. See chapter 16 of the Appendices Document. For the survey questions that will be used, these are provided by the research of Terpstra and Buijs (2020) and have been altered to fit this research.

The second part consisted of a primary sourced, semi structured, focus group-based data collection in which the subjects participated after they conducted the two surveys. By conducting this form of qualitative research to the two experimental groups, more in-depth knowledge was gained on the

thoughts, experiences and feelings of the groups. This also gave the qualitative part of the research more background. The used form for the focus groups with the used question and set-up can be found in chapter 17 of the Appendices Document.

The focus group research consisted of 2 group discussions with 6 subjects per group (as mentioned in 4.3.2) and took place via the online communication platform Microsoft Teams. The discussion was led by a facilitator who was responsible for guiding the group through the discussion and kept the group focused on the desired topics. To make sure the conversation was recorded, a so called note taker was also present to record the meeting, taking notes of striking events during the meeting and keeping an eye out on the time. Two researchers from HZ University of Applied Sciences and other members of the research team were silent attendees during the focus groups. Together, the collected data will be the input for the data analysis.

4.3.5 Data preparation

Survey

The data of the survey experiment will consist of one filled-in questionnaires per participant of the control group and two filled-in questionnaires per participant of the treated group. The choice was made to use Survey Monkey (Momentive Inc., 2021) to conduct the surveys. Before it is possible to analyse this data, the data needs to be put into the statistical computer program SPSS (IBM Corp, 2020). This is done by exporting the results out of Survey Monkey to a SPSS compatible file format. When the rough data is imported this needs to be organized so it is easier to work with for the next steps. This is done by giving every variable/item the question number (Q1 till Q25) followed by the sort of test (pre post control) whereafter the subject (General/Zolder/Buurt/vluchten/control) is mentioned with the construct (Vertrouwen/Angst/Effectief) it would belong to and a traceable name pointing at the question.

Some of the subjects, mainly in the control group, did not finish the survey completely.

These subjects need to be filtered out, because it wouldn't be fair to compare items they are included in, versus items they are not included in.

	exp	Factor	control	Factor
M	12	0,95833333	12	1,08333333
F	11	1,04545455	14	0,92857143
Gem	11,5		13	

Figure 6: Weight case

Besides that, one person from the experimental group also filled in the control group survey, these results cannot be used for the control measurement. Because the distribution of male female is not equal, a "weight case" must be added. This results in a computation factor higher than 1 for the variables of the smaller group. This will offset the differences to equal values for males and females.

Some of the questions are put in positive rating (higher rating is higher trust/fear/efficacy) others are the reverse order to make sure the error evens out. To be able to analyze the data the negative items must be mirrored by recoding them, so they have the same rating scale as the positive ones. The next step is to combine as many items per question as possible in one scale. This is checked by putting the results of all items of the question in a factor analysis. This tool analyzes the variance in answers given. If answers have a high comparability they will be put in the same scale. When this isn't the case and the eigenvalue exceeds 1, an extra component is needed. This is done for every question with its belonging items. Whereafter the components with multiple (>1) items can be computed by adding them together and dividing them by the number of items in them. This creates new variables for these items.

After all variables are known and set in the right way reliability analysis are done for every scale in the file. This reliability analysis looks at the answers per scale given and sees if they consist of logical values. If this isn't the case the item or scale would get a low Cronbach's Alpha Internal consistency factor. A value below 0,80 is already doubtful and means the question might not be so reliable. This was done for every item and scale is as well pre, post and control test. A list as shown in Figure 7: Reliability analysis was created. For the full reliability analysis see chapter 18 of the Appendices Document.

Thema	Name	Construct	Number of item	Example item	Scale type	Internal consistency Pre	Type	Internal consi	Type2
Action #3 Fleeing	Q17	-	1	Fleeing method		N.A.	N.A.	N.A.	N.A.
	Q18	Fear appeal	4	Evoked feelings fleeing		0.906 (0.909)	Cronbach's Alpha	0.891 (0.892)	Cronbach's Alpha
	Q19	Self-efficacy	3	Self-efficacy in fleeing		0.878 (0.877)	Cronbach's Alpha	0.867 (0.864)	Cronbach's Alpha
	Q20	Behavioural intention	1	Grade fleeing		N.A.	N.A.	N.A.	N.A.
	Q21	-	1	Comments		N.A.	N.A.	N.A.	N.A.

Figure 7: Reliability analysis

After the data was sorted, were possible merged and checked for reliability the real analyzing could begin in the next steps.

Focus group

During the focus group session a recording and automatic transcription were made via the built-in tool of Microsoft Teams. This the automatic transcription that Teams made itself was then checked by watching the recording and was then altered where necessary. This resulted in two verbatim (word-for-word) transcriptions which were then used to analyse and summarise the two focus groups.

4.3.6 Data analysis

The SPSS output can be found in chapter 23 and 24 of the Appendices Document.

Initial analysis (T test)

The first analysis done was to compare the results between the three available tests and see what the differences are a so-called "Paired sample T test". To get the basic data from SPSS Descriptive statistics were done for all the variables by running frequencies analysis and checking for mean, median and mode. Resulting in an extensive report. A small part of it is shown in Figure 8 - Output SPSS Frequencies analysis.

		Statistics				
		Q3_Post_Gevo lg_wegen	Q3_Post_Gevo lg_huizen	Q3_Post_Gevo lg_nutsvoorzie ning	Q3_Post_Gevo lg_telefonie	Q3_Post_Gevo lg_herstel
N	Valid	49	49	49	49	49
	Missing	0	0	0	0	0
Mean		3.7818	3.5968	4.5444	3.6809	3.7860
Median		4.0000	4.0000	5.0000	4.0000	4.0000
Mode		4.00	4.00	5.00	4.00	4.00

Figure 8 - Output SPSS Frequencies analysis

Because the data was now put into separate output reports it was difficult to interpret. To make a clear overview of this data, an Excel spreadsheet was used to put all the data in. This data consisted of the individual items and scale results (put in bold underneath the items it consists of) of the pre, post and control test. Because it would take much time to type in the data from the SPSS report manually, the Excel file was made to be searching for the values needed.

Questions			Mean			Median			Modus		
			Control	Pre	Post	Control	Pre	Post	Control	Pre	Post
Q2	Q2	Gevolg_waarschijnlijk	2,76	2,67	2,67	3	2	2	2	2	2
Q3	Q3	Gevolg_wegen	3,67	3,70	3,91	4	4	4	4	4	4
	Q3	Gevolg_nutsvoorziening	4,61	4,52	4,47	5	5	5	5	5	5
	Q3	Gevolg_telefonie	3,56	3,83	3,82	4	4	4	4	4	4
	Q3	GEVOLGEN_infra	3,95	4,02	4,07	4	4	4	4	4	4

Figure 9 - Overview descriptive analysis

After this overview was made, the differences between the tests were calculated. As mentioned in the chapter “Research design”. The control and pre-test were compared, to see if the difference between these groups isn’t significant. Besides this the pre and post-test were compared, to see if the documentary made a significant change.

Questions			Mean			Control - Pre		Post - Pre	
			Control	Pre	Post	Contr-Pre	Sign.	Post-Pre	Sign.
Q8	Q8	Zolder_Angst_angst	3,76	3,19	2,89	0,569	0,029	-0,307	0,268
	Q8	Zolder_Angst_naar	3,92	3,36	3,15	0,559	0,031	-0,216	0,274
	Q8	Zolder_Angst_geruststellend	2,39	2,52	3,08	-0,132	0,640	0,561	0,042
	Q8	Zolder_Angst_zekerheid	2,45	2,65	3,08	-0,195	0,408	0,432	0,070
	Q8	ZOLDER_ANGST	3,71	3,35	2,97	0,364	0,072	-0,379	0,100

Figure 10 - Overview basic analysis

For a complete and up-to-date version of the basic analysis see chapter 19 of the Appendices Document.

Analysis pre post (Repeated measures)

For the detailed analysis between the pre and post-test a repeated measures analysis was done. The choice for this analysis was made because it is possible to analyze the same group of participants on two moments (pre and post), the so-called “Within-subjects variables” and add a “between subject factor”. In this particular case the gender was put as a between subject factor, because quite some differences between the results of different genders were found during the T test.

The results of this test that were used for further analysis were:

- Mean values per gender per scale
- Mean value of all genders combined per scale
- Difference between pre and post
- Significance level over total pre and post per scale
- Total significance level over pre and post hypothesis
- Significance level over gender per hypothesis

The analysis had to be done per hypothesis to be able to measure the tot effect of the hypothesis and the effect of the gender on it. For the complete dataset of this analysis see chapter 20 of the Appendices Document.

Question		Gender	Pre mean	Post mean	Post-Pre	Sign.
Hypothesis attic	Q8 Fear (1-5)	Man	3,104	2,688	-0,416	
		Woman	3,591	3,250	-0,341	
		Overall	3,337	2,957	-0,380	0,104
	Q9 Response Efficacy (1-5)	Man	4,000	4,000	0,000	
		Woman	3,273	3,788	0,515	
		Overall	3,652	3,899	0,247	0,060
	Q9 Risk (1-5)	Man	2,833	2,417	-0,416	
		Woman	3,182	2,727	-0,455	
		Overall	3,000	2,565	-0,435	0,094
	Q10 Attitude (1-10)	Man	7,083	7,750	0,667	
		Woman	5,455	6,546	1,091	
		Overall	6,304	7,174	0,870	0,023
Total effect measure						0,144
Total effect gender						0,373

Figure 11 - Overview pre post

These values were put into a spreadsheet to make them easily readable and comparable. A small part of this list is shown in Figure 11 - Overview pre post.

The values create a clear overview of what has changed when comparing the post to the pre-test. In the example of Figure 11 - Overview pre post it is clear to see fear, in the option “seek for shelter in your attic” has been significantly lowered for as well males as females.

The same process was done for all other hypotheses. The full overview is available in the chapter 20 of the Appendices Document.

Analysis control post

As discussed in the chapter “Research design”, a control group was added to the experiment to be able to validate results to a more certain amount. In the basic analysis this control group was compared with the pretest and had to be as comparable as possible. For the actual analysis, the decision was made to compare the control group to the post test of the experimental group, to be able to see what the difference in theoretical change would be between two groups that made the same survey in the same period of time.

To be able to analyze this it wasn’t possible to use the same “repeated measures” method. Because this analysis would not make use of the data of one participant on two moments. For this a Multivariate test was needed. This analysis method was capable of splitting the same variables (in this case the scales) in to separate groups (in this case an experimental and control group). This was done by giving every participant a new variable, the group number. 1 for experimental 0 for control group.

Besides it being a different analyzing method, the interpretation of the results was similar. The same values were extracted from the SPSS output files. For the complete dataset of this analysis see chapter 20 of the Appendices Document.

Combining results of both analysis

The values were put into the same file and format as done in the previous analysis, to keep all values to be comparable to each other. This caused the overview to evolve as shown in Figure 12 -

Overview analysis pre/post and control/post. For the complete overview of all results see chapter 20 of the Appendices Document.

	Question	Gender	Pre mean	Post mean	Post-Pre	Sign.	Control mean	Post mean	Post-Control	Sign.	
Hypothesis attic	Q8 Fear (1-5)	Man	3,104	2,688	-0,416		3,708	2,688	-1,020		
		Woman	3,591	3,250	-0,341		3,714	3,250	-0,464		
		Overall	3,337	2,957	-0,380	0,104	3,712	2,957	-0,755	0,010	
	Q9 Response Efficacy (1-5)	Man	4,000	4,000	0,000		3,278	4,000	0,722		
		Woman	3,273	3,788	0,515		3,643	3,788	0,145		
		Overall	3,652	3,899	0,247	0,060	3,474	3,899	0,425	0,072	
	Q9 Risk (1-5)	Man	2,833	2,417	-0,416		3,417	2,417	-1,000		
		Woman	3,182	2,727	-0,455		3,000	2,727	-0,273		
		Overall	3,000	2,565	-0,435	0,094	3,192	2,565	-0,627	0,041	
	Q10 Attitude (1-10)	Man	7,083	7,750	0,667		5,833	7,750	1,917		
		Woman	5,455	6,546	1,091		6,857	6,546	-0,311		
		Overall	6,304	7,174	0,870	0,023	6,385	7,174	0,789	0,180	
		Total effect measure								0,144	0,090
		Total effect gender								0,373	0,772

Figure 123 - Overview analysis pre/post and control/post

Focus group

The data of two focus groups consist of two Dutch verbatim transcriptions (see chapter 21 of the Appendices Document.) and were first thoroughly read. The participants' answers were then categorised by their answer and converted to English quotes. The quotes from the same answer that belonged together were summarised and a small description was added. This was then all put together and resulted after this simple analysis in the results of the focus groups. These results will

show more in-dept knowledge on the thoughts, experiences and feelings of the experimental group after they have seen the documentary.

4.4 RESULTS

In this part the results of both the survey and the focus groups will be covered.

4.4.1 Survey

This paragraph will show the results of the surveys that have been taken in the two different groups. It contains only a part of the results, for the complete results, see chapter 20 of the Appendices Document.

Table 7 - Results per study design: difference and significance ($\alpha \leq 0.10$) and if the documentary has had effect

Question/construct	Difference post-pre (sign.)	Difference post-control (sign.)	Effect documentary
Hypothesis general			
Q2 Probability flooding (1-5)	0.000 (0.974)	-0.115 (0.802)	No
Q3 Consequences infra (1-5)	0.058 (0.731)	0.111 (0.556)	No
Q3 Consequences homes (1-5)	-0.130 (0.493)	0.032 (0.990)	No
Q3 Consequences recovery (1-5)	0.217 (0.368)	0.057 (0.782)	No
Q5 Fear flooding (1-5)	0.008 (0.986)	0.048 (0.774)	No
Q6 Trust safety and water management (1-5)	-0.098 (0.678)	0.065 (0.794)	No
Q6 Trust Crisis management and communication (1-5)	0.018 (0.903)	0.389 (0.162)	No
Total effect of measure	(0.642)	(0.587)	No
Hypothesis attic			
Q8 Fear (1-5)	-0.380 (0.104)	-0.755 (0.010)	Yes
Q9 Response Efficacy (1-5)	0.247 (0.060)	0.425 (0.072)	Yes
Q9 Risk (1-5)	-0.435 (0.094)	-0.627 (0.041)	Yes
Q10 Attitude (1-10)	0.870 (0.023)	0.789 (0.180)	Yes
Total effect of measure	(0.144)	(0.090)	Yes
Hypothesis community shelter			
Q13 Fear (1-5)	-0.261 (0.212)	-0.019 (0.959)	No
Q14 Response Efficacy (1-5)	0.290 (0.199)	-0.252 (0.470)	No
Q14 Risk (1-5)	-0.609 (0.023)	-0.288 (0.228)	No
Q15 Attitude (1-10)	1.435 (0.011)	0.647 (0.313)	No
Total effect of measure	(0.099)	(0.088)	Yes
Hypothesis fleeing			
Q18 Fear (1-5)	-0.435 (0.029)	-0.647 (0.020)	Yes
Q19 Response Efficacy (1-5)	-0.290 (0.298)	-0.511 (0.130)	No
Q19 Risk (1-5)	0.043 (0.794)	-0.368 (0.282)	No
Q20 Attitude (1-10)	0.174 (0.678)	-0.148 (0.814)	No
Total effect of measure	(0.049)	(0.017)	Yes
Response efficacy			
Q22 Stay at home (1-5)	0.087 (0.590)	-0.028 (0.946)	No
Q22 Stay at friends/family home (1-5)	0.044 (0.863)	-0.035 (0.959)	No
Q22 Go to community shelter (1-5)	0.174 (0.463)	-0.042 (0.994)	No
Q22 Flee Zeeuws-Vlaanderen (1-5)	-0.478 (0.099)	-0.468 (0.246)	Yes
Total effect of measure	(0.615)	(0.649)	No
Hypothesis Intention			

Q25 Raised awareness (1-5)	0.479 (0.017)	0.042 (0.721)	Yes*
Q25 Think more about (1-5)	0.435 (0.039)	-0.012 (0.955)	Yes*
Q25 Seek information (1-5)	0.869 (0.001)	0.642 (0.066)	Yes
Q25 Take measures (1-5)	0.870 (0.001)	0.522 (0.148)	Yes
Total effect of measure	(0.000337)	(0.146)	Yes

The first column of *Table 7* show the difference in the given scores of the experimental group during the pre-test survey and the post-test survey, together with the significance of this difference. The second column shows the difference between the control group survey and the experimental post-test survey. When the difference is significant, the colour of the box is green. If not, it is orange/red. As seen in both columns the general risk perception has not changed significantly, not even on the individual question/construct scale. This means that the documentary has no significant effect on the general risk perception of the inhabitants of Kloosterzande and surrounding areas (H_0 is accepted).

For seeking shelter on a higher floor the experimental group does differ significantly on the individual items within the experimental group after the intervention in the expected direction. The total effect is almost significant. The experimental group also differs significantly with the control group on both the individual items and total effect. This means that the documentary has a significant effect on the attitude towards the option 'shelter on a higher floor' of the inhabitants of Kloosterzande and surrounding areas (H_1 is accepted).

The questions about seeking shelter in a community shelter differ between the pre and post-test almost all significantly. The control and the post-test survey only shows a significant difference in the total effect. This means that the documentary has a significant effect on the attitude towards the option 'shelter in a community center' of the inhabitants of Kloosterzande and surrounding areas, also in the expected direction (H_1 is accepted).

The scores that were given at the fear item of the fleeing strategy are in both analyses significantly different, in the opposite direction of what was expected. The response efficacy question does change in the expected direction, but is not significant. The total effect is for both columns significant, which means that the documentary has a significant effect on the attitude towards the option 'fleeing' of the inhabitants of Kloosterzande and surrounding areas. Although, it is not sure if the participants are more or less likely to choose for this option. In the response efficacy section (Q22 Flee Zeeuws-Vlaanderen) it indicates that the participants of at least the experimental group find this strategy less likely to choose (H_1 is accepted).

In the final section of behavioral intentions the items about raised awareness, thinking more about and taking measures seem contradicting, as the pre and post-test differ significantly and the control and the post-test survey do not. The item about seeking information does differ significantly in both columns and also the total effect shows a significant effect within the experimental group. The control and the post-test survey is almost significant. Together this resulted that the documentary has a significant effect on the intentions of the inhabitants of Kloosterzande and surrounding areas (H_1 is accepted).

4.4.2 Focus group

This paragraph will show the summary of the two focus groups that have taken place with the experimental group. For the two (Dutch) verbatim transcripts, see chapter 21 of the Appendices Document.

4.4.2.1 First impressions documentary

In the first focus a participant starts talking about what they missed, like the explanation of the importance of warm blankets and turning of the main electricity switch. Another participant backs

him up by saying that all the utilities will shut down. Another participant states that saying these things in a calm video is very easy, but *“is everyone aware of this? I can see this, but there are maybe 10,000 people living here in the region. And I think more than half of those people are not aware of it. I think that is a very important point of communication in such a situation.”* The participants mainly mention practical considerations.

In the second focus group a participant states that the documentary is not that refreshing for them personally. His parents have lived through the 1953 flood, so they always told him what he should do in that case of a flooding. A younger participant agrees, as he has heard stories from elderly people but says that he likes about the documentary *“that it explains how it is handled and who is behind it and what happens. So I thought it was a very enlightening video.”*

Other comments of the participants:

- *“(..) I also thought it was a very clear and understandable video, that it also explains now what those people at the Water Board are always doing.*
- *“(..) I thought that the film radiated knowledge and skill, which actually gives us a lot of confidence that we can survive such a flood.”*
- *“(...) when I now see how people can analyse weeks in advance, determine water levels, how high our dykes are, I myself have little concern about that.”*

4.4.2.2 Believability scenario

One participant of the first focus group expresses doubts about greatness of the North Sea water swelling into the Western Scheldt because of the changing wind currents as result of the changing climate. Someone else says *“(..), maybe it's a generational thing, but I can't imagine it.”*

In the second focus group participants think it could be a possibility, as *“nature is not in your control, (..)”*, although not in the near future. But another participant also has confidence in the Water Board if such a scenario will occur.

4.4.2.3 Acting during potential flooding

In both focus groups a few participants react very definite:

- *“I live in a fairly new house myself. I would go to the attic or one floor up regardless, because that shouldn't be a problem with us. And make sure that I can get by on water and food for at least four or five days. And make sure you have warm clothes.”*
- *“I know for sure, I am going to sit in the attic. Because, if we all leave, then all the roads will fill up and it will be chaos. You just can't get out of the province. So I'll just stay at home, sit in the attic and wait.”*
- *“I just used the time available to go to overstroomik.nl. And here, in a very simple way, it explains what you can do in the various scenarios. And then I think we'll be able to manage at home as well.”*
- *“When I built this house, I had already anticipated the height of Kloosterzande. My house was also built 50 centimetres above the axis of the road. So if the water level in Kloosterzande rises by two metres during a heavy flood, mine will only be one metre. So I just go to my attic.”*

But others also said that they would flee the area and seem to have thought about it:

- *“I would definitely not stay here. I would pack my bags, most important things, maybe take some important things upstairs, but get myself out of the area.”*
- *“Yes, I could also manage at home. But if we knew in time, I would still load up my camper and maybe go to other places that are a bit higher. So I have that option too, but I wouldn't do it at the very last moment, because then it would be too late. But if I am early enough, I can still go to other places in Europe.”*

- *“The most important things up in the attic and then I'm off.”*
- *“I would (..) flee to the south. If you go to Sint Niklaas, that's 25 kilometres and it's already 20 metres higher than here. So you're already going in the right direction.”*

4.4.2.4 Trust in the government's evacuation advice

People show trust in governmental institutions from the area (Zeeuws-Vlaanderen) and the public broadcaster: *“I actually trust most people who come from this side, if I may say so. If a safety officer, the chairman, comes from Nijmegen and tells me what has to happen in Zeeuws-Vlaanderen, I think, well, stop it, because I don't trust you directly. (..) if someone far away is going to judge and communicate what we should do, no, I wouldn't like that. I would rather say someone from the region, like the man from Terneuzen, who would know best. And the public broadcast of Zeeland, of course.”*

Someone from the other focus group states something similar: *“(..) I have faith in, well, not in the national government, but in these local people who know exactly what needs to be done here, so to speak.”* But he also has a lot of trust: *“Yes, after seeing the documentary, I have full confidence that the right choices will be made, so to speak. I don't lose any sleep because of that.”*

Other comments of the participants:

- *“Basically, I am confident that all these people know what they are talking about. So if something intelligent comes out of it, I will certainly take it to heart. Well if, for example, it results in an urgent recommendation to evacuate, then you get the same issue as before: do you leave the house or do you go upstairs. That's always a choice you make yourself, but I certainly wouldn't doubt what these people throw into the world.”*
- *“I do have faith in the institutions that were portrayed in the documentary. I think they are doing a good job.”*
- *“Yes, my confidence is also quite high in the government. They have competent people, good information. Yes, I do have confidence in them.”*

4.4.2.5 New insights

After the participants watched the documentary, they gained new insights from it (and the research). The participants from the first focus group mainly talks about the level of expertise mentioned in the documentary:

- *“Well, what I saw in general was the quality of our dykes, that we can rely on that.”*
- *“What struck me is that there is more expertise than I had expected. That they can indeed determine and predict the water level to within a few centimetres so far in advance. I didn't know that this was so adequately organised. That actually surprised me.”*
- *“I thought it did express expertise, and that people did seem to understand it.”*

But someone also expressed their doubts: *“There is always talk about dike monitoring, but I don't know whether that is really adequate or whether they can protect what they have to protect.”*

The other focus group talks more about the practical measures that can be taken in the event of imminent flooding:

- *“Well, I have to say, when I got your questionnaire a few weeks back, I started looking at it more. We always have a reasonable stock at home.(...) But well, some basic things we don't keep. We don't have water, for example, and there are more little things like that where we have agreed at home that we will look for the most necessary things to have at home, like a torch and all that kind of stuff you need in an emergency. So that awareness has come now.”*
- *“Well don't get into your car, huh?”*
- *“What did dawn on me was that Vogelwaard, for example, we have a village centre, but it's only on ground level. It has a relatively small upper floor, so it can accommodate so few*

people. Only a fraction of the village can go there, a few people, so that's not it. There is no building in the village with sufficient space at heights."

4.4.2.6 Relevance and completeness of documentary

The participants think that the documentary *"could also show a bit of the rough part"* and can *"show what is happening here at this water level"*:

- *"(..) what will happen when the sea rises 50 centimetres and what will happen to your own region when it is under water? Then it might start to live a little more in the region. (...) then you see where in this area the water will come from and you might think: oh shit, I know someone who lives there."*
- *"Now you see more lovely images but there were also times, like October, when you can of course pick up the tidal calendar. And of course you can show a little bit of the rough part. What the sea can do here on the sea dyke. It's a nice documentary for sure, but it's a bit touristy. There is a lack of danger actually."*

Someone is missing more specific examples: *"(..) I think it would be handy if the inhabitants here in Zeeuws-Vlaanderen were informed about what to do if such a scenario occurs, what to do then? What you should do, what the possibilities are or what you should have in house, et cetera."*

4.4.2.7 Trust in self-efficacy

The documentary made one participant *"more aware"* and gave him more confidence: *"it would be good to bring that to everyone's attention."* Others are saying the same:

- *"I think I can make the right choices, yes. With the help of instructions and advice from the region, I think I can make the right choice, yes."*
- *"I do think that the province or local council should do something about it by means of a handout or documentary on broadcaster Zeeland to show what could happen. It opened up things for me. I think that would apply to many people."*
- *"(..) I think it would be good to tell the inhabitants of Zeeuws-Vlaanderen (..) in a good way what they should do in case of, you know, food, find a higher place and that a nice / well edited film and information would help."*

But a participant who has experienced the 1953 flood claims that he has not become more aware: *"I heard and saw a lot from my parents, grandparents and neighbours. I was already aware of the how and the what and I was also aware of what I would do if there was danger."*

4.4.2.8 Impact research on safety perception

Overall the participants already felt really safe in their area: *"I wasn't worried at all"* but *"I was surprised by what I saw in the documentary, that they can predict the water level so accurately. That is a nice thought, of course."* Most participants state the documentary has increased their feelings of safety, and they also feel like this documentary or related information should be shown more broadly: *"it would not be bad to have a piece of information in the municipal magazine for all those sites. I think that is still unknown to many people. And, I think we can gain something from it, I think."*

4.5 DISCUSSION

In this chapter, the limitations and shortcomings of the used method are discussed, together with the results of the experiment. The contribution of the results for practice or society are also mentioned and recommendations for follow up research are given.

4.5.1 Limitations and shortcomings method

In this research, two different study designs are applied: the pre-test-post-test study design and the post-test-only control group study design.

The pre-test-post-test study design has a few limitations that could threaten the internal validity of the research. The first limitation is the reactive effect, that can happen when the same group of participants use the same instrument more than once (Kumar, 2019). The instrument educates the participants and can influence their responses in the post-test. To minimise this effect, the post-test was conducted at least one week after the pre-test with the intention that this effect would fade over time. Another limitation that could have occurred with this study design, is the regression effect (Kumar, 2019). Participants who gave extreme low or extreme high scores in the pre-test survey, could have regressed towards the mean in the post-test survey. The participants with the extreme attitude could have thought about their answers and shift at the time of the post-test towards the mean. And even though this design allows to compare the data before and after the intervention, it still does not enable to conclude that the change has happened solely due to this intervention (Kumar, 2019). Therefore, this study used two different designs, one involving a control group, to overcome this problem (Kumar, 2019).

The post-test-only control group study design also suffers from limitations. Selection bias is in the case of this study the most obvious and dangerous limitation, as participants could choose whether or not they would participate in the research and also in which group (Flannelly, Flannelly, & Jankowski, 2018). Firstly, the experimental group would have been a group of people who were already interested in the research subject, as they knew beforehand that they would spend at least 1.5 hours of their time by participating. Secondly, the control group was created through the experimental group, as they were asked to forward the online questionnaire to family and friends in Kloosterzande and its surrounding areas. Again, the participants could choose whether to help the research, and also the family and friends who were asked could choose whether to participate. To reduce most of the effects of the limitations in the research, another design like the pre-test-post-test control group design could have been chosen. In this design the control group will also fill in the survey two times with a certain time in between, just like the experimental group. The only difference between the two groups, is that the control group is not exposed to the intervention. Now both groups suffer from the reactive effect, but this can be averaged out when comparing the two groups. The control group will control for the regression effect and it is possible to prove the effect of the intervention. This design can still struggle with the selection bias. But if the total group of participants is big enough, random allocation of the experimental group and control group can solve the regression effect (Flannelly et al., 2018).

The focus group sessions can also suffer from limitations. Two have been formulated, the first one being that the focus group is an open conversation. It is not predetermined beforehand and the moderator has less control over the data that is produced (Gibbs, 1997). The second one is that individuals may not express their own definitive individual view as they talk in a group setting (Gibbs, 1997).

4.5.2 Reflection results

Overall, the pre-test-post-test study design showed the difference between pre-test and post-test and indicated whether a change had taken place as a result of the scenario, the documentary and also extraneous variables together. In the post-test-only control group design, the post-test survey of the experimental group and the control group survey were compared. This formed an impression of the change in the experimental group also with respect to the scenario, the documentary and the extraneous variables, although these were two different groups. Also see *Table 8*. When the

difference between the pre-test and post-test was significant and also between the post-test and the control group, it was concluded that this was the effect of the documentary.

Table 8 - Oxo diagram research setup

	N	Pre-test with flood scenario	Intervention (documentary)	Post-test with flood scenario
Experimental group	23	X	O	X
Control group	26			X

The goal of the documentary is to lower the risk perception and increase the belief in self-efficacy towards the option 'shelter on a higher floor'; 'decreased' feelings of fear and a 'higher' self-efficacy should lead to a more positive attitude (higher score) for this option. The opposite is desired for the option 'fleeing': 'increase' feelings of fear and 'limit' self-efficacy, which results in a more negative attitude. This is in line with the extended parallel process model (EPPM) proposed by K. Witte (1992), that argues that fear leads to the rejection of the message, while perceived threat and efficacy lead to the acceptance of the message. Following this argumentation, the participants who watched documentary will in theory accept the option 'shelter on a higher floor' and will reject the option 'fleeing'.

Although a 'decreased' feeling of fear is desired for the option 'shelter on a higher floor', fear should not totally fade, as some fear is necessary for people to actively seek information and to adopt self-protecting measures (Kievik & Gutteling, 2011).

The fear towards the option 'shelter on a higher floor' went down with 0.38 on a five point scale between pre-post 0.76 at the post survey compared to the control survey. Response efficacy went up with 0.25 and 0.43 respectively. These changes in fear appeal resulted in an increase of attitude with 0.87 on a ten point scale and 0.79 respectively. All the differences on the individual items are statistically significant. This is completely in line with the expectations. The total effect of the measure is almost significant with 0.14 between pre-post and significant at the post survey compared to the control survey with 0.09. Because all the individual items differ significantly, the difference is considered to be the effect of the documentary. A participant from the focus group also mentioned that the documentary provided him insight in what to do and that he now believes that he can manage to stay at home: *"I just used the time available to go to overstroomik.nl. And here, in a very simple way, it explains what you can do in the various scenarios. And then I think we'll be able to manage at home as well."*

The option 'seeking shelter in a community centre' was not explicitly mentioned in the documentary, but is worthwhile to mention. Fear decreases and self-efficacy increases between the pre and post-test, although not significantly. The perceived risk decreases significantly and the attitude positively increases significantly with 1.44 on a ten point scale. The total effect of this measure is significant with 0.099 between pre-post. The individual items of the post survey compared to the control survey do not differ significant, although the total effect is significant with 0.09. That is why there is considered to be an effect of the documentary on this option, however, it is not that big. Nevertheless, participants in the focus group started to think about the possibilities of finding shelter in their local community: *"What did dawn on me was that Vogelwaard, for example, we have a village centre, but it's only on ground level. It has a relatively small upper floor, so it can accommodate so few people. Only a fraction of the village can go there, a few people, so that's not it. There is no building in the village with sufficient space at heights."*

The fear item belonging to the option 'fleeing' significantly differs for both the pre-post and the control-post. However, the fear decreases with 0.44 and 0.65 respectively in the opposite direction

of what was intended. The self-efficacy also decreases (as intended) but is not statistically significant. The attitude increases (0.17 on a ten point scale) in the pre-post analysis and decreases (0.15) in the control-post analysis, so no clear pattern is found here. The total effect is for both columns significant, which indicates that the documentary seems to have an effect. Although, it is not sure if the participants are more or less likely to choose for this option. In the response efficacy section (Q22 Flee Zeeuws-Vlaanderen) it indicates that the participants of at least the experimental group find this strategy less likely to choose. A few people also mention in the focus group that it is still a plausible option for them: *“I would definitely not stay here. I would pack my bags, most important things, maybe take some important things upstairs, but get myself out of the area.”* This indicates that the documentary may not have aroused the fear of these participants enough. That is also something that comes forward in the focus group: *“(..) It's a nice documentary for sure, but it's a bit touristy. There is a lack of danger actually.”* This may explain the contradicting results for this option.

Another goal of the documentary was to have a positive effect on flood awareness. The items about ‘raised awareness’, ‘thinking more about’ and ‘taking measures’ seem contradicting, as the pre and post-test differ significantly and the control and the post-test survey do not. The item about seeking information does differ significantly in both analyses and the total effect between pre-post shows a significant effect. The control and the post-test survey is almost significant. When looking at the cut-out of the results in *Table 9*, it shows that the control group already gave a quite high score for these two items compared to the pre-test of the experimental group. The result was that the difference between the post-test of the experimental group and the control group is now not significantly different. One reason for the high answers from the control group could be that the participants here were trying to give a socially desirable answer.

Table 9 - Average answer question 25 about behavioural intentions (cut-out from Table 7)

Item	Pre-test	Post-test	Difference	Control group	Post-test	Difference
Raised awareness (1-5)	3,217	3,696	0,479	3,654	3,696	0,042
Think more about (1-5)	3,130	3,565	0,435	3,577	3,565	-0,012
Seek information (1-5)	2,696	3,565	0,869	2,923	3,565	0,642
Take measures (1-5)	2,652	3,522	0,870	3,000	3,522	0,522

But because the difference between the total effect of the measure of the pre-test and post-test is so statistically significant, it is considered that the documentary has this effect on the behaviour intentions. This also became apparent in the focus group: *“Well, I have to say, when I got your questionnaire a few weeks back, I started looking at it more. We always have a reasonable stock at home.(...) But well, some basic things we don't keep. We don't have water, for example, and there are more little things like that where we have agreed at home that we will look for the most necessary things to have at home, like a torch and all that kind of stuff you need in an emergency. So that awareness has come now.”*

For the first two options the results are in line with the arguments of the EPPM and are also in line with the goal of the documentary, for the third option this is more abstract. Nevertheless, the documentary has a positive effect on the behaviour intentions, which was also one goal that has been met.

4.5.3 Contribution of the results for society

During the Joint Learning Event several experts reacted to the research. Bart Vonk, Chair of the National Coordination Committee for Flooding and Water Distribution of the Dutch Water Management Centre, said the following:

“(..), I do think that raising awareness of the fact that floods can also happen in the Netherlands is a real challenge for all of us. Simply because, at the end of the day, a bit of individual responsibility remains with the citizen.” ... “Help citizens to see what the risk is, help them to become aware and also ensure that the communication message is in tune and I think, I really have a big compliment for the work that these students have done. I think material is very good. I think your research approach is very good, with a group of respondents post and pre and a control group and making those comparisons. I think: well, hats off to you for doing that. I think it is really well put together.” ... “You conclude that you cannot change someone's perception with such a video. It takes more than that, but I really do think that if this video is shown often and we really use it in our communication material, that it really does have an added value in increasing awareness, so once again, a big compliment for your work.”

Another expert, Marcel Matthijsse from the Safety Region Zeeland, said the following:

“I want to give you a compliment, for the documentary itself, but also for the whole research, we as the safety region are really interested in the results of it.” ... “I think as mentioned before, we are dealing with nature forces that are difficult to predict, the question shouldn't be if we go and evacuate, but we just need to do it when the decision is made and don't start a discussion about it as we always tend to do in this country.”

These two quotes indicate the importance of the documentary in the broader context and show why this research was important.

4.6 CONCLUSION

Within this research the effects of a documentary as a communication tool on the attitudes of the inhabitants of the municipality of Hulst towards evacuation was tested. This was done in quantitative research that was conducted by a survey in a “before and after experimental design with post-test only control group”. To gain a deeper understanding of the results a qualitative focus group experiment was conducted. The research and the data belonging to it was validated and offset from errors as much as possible within the possibilities of this project, whereafter it was analysed with different methods to come to the following conclusion of the main research question:

“What are the effects of the documentary as an instrument to influence the flood risk perception among the inhabitants of Kloosterzande and surrounding areas, in case of an imminent flood where preventive evacuation is no longer possible?”

To answer this research question, the generated sub questions were answered by the results of the experiments conducted:

- The survey shows the general risk perception wasn't changed significantly by the documentary. The responses in the focus groups confirm this and indicate an already positive view on this subject.
- The attitude towards the option “shelter on a higher floor” has changed in a positive and expected way according to the survey as is confirmed in the focus groups.
- The attitude towards the option “shelter in a community centre” has changed positively in the survey, although no focus was put on to this subject in the documentary. The focus groups indicate this option is highly dependent of the situation.
- The attitude towards the option “fleeing” was changed by the documentary, the fear of this option decreases, what was unintended. The other scales change in the expected manner.
- The intentional behaviour of the experimental group has all changed significantly to the expected positive direction. The control group scored already high on multiple of these intentions. The focus groups gave an already positive or increased positive attitude towards their intentions.

The documentary has an expected influence on the attitude towards “shelter on a higher floor” “shelter in a community centre” and partly on “fleeing”. This also accounts for the intentional behaviour. The documentary does not directly have an influence on the general risk perception.

Thus, the documentary does have effect on the total flood risk perception among the inhabitants of Kloosterzande and surrounding areas.

4.7 RECOMMENDATIONS FOR FURTHER RESEARCH

During this research process, several experiences lead to discussion of the approach of the research. Also, time restrictions did not allow the researchers to analyse the entire dataset in depth. That is why a few recommendations for further research are presented in this paragraph.

The first recommendation for further research is to gather a larger group of participants and then divide them based on a few population characteristics (such as gender, age and whether they experienced the 1953 flood) into an experimental group and a control group (the so-called stratified random sampling method). This way, the results of that experiment can be generalised to the entire (or a smaller part of the) population of Zeeland. Another possibility is to expand the research area of Kloosterzande and its surroundings to see how residents of other flood prone areas in Zeeland react to the documentary.

Another recommendation is to compare the data of this research with the data of the Zeeland-wide survey of Terpstra & Buijs (2020), where they asked inhabitants about their perceptions and intentions in case of an imminent flood. Except, there was no scenario mentioned in this research. This way, the control group can be compared to the Zeeland-wide sample and the effect of the scenario can also be determined.

The final recommendation is to take a closer look at the data collected in the study. The analysis is fairly global at this point, but the results could be expanded by selecting certain characteristics of the participants. This is already partly done for gender, but could also be applied to age, whether they experienced the 1953 flood, whether they depend on others in daily life and whether they expect a dry floor in their own home. This would deepen the findings, but was not done in this study due to lack of time.

5 JOINT LEARNING EVENT

5.1 GOAL

Following the intention to approach the research in a holistic sense, set at the beginning of the process [2.3 Approach], we facilitated an exchange moment between stakeholders to accomplish joint learning and create room for change. This was organised as a hybrid livestream event, for an audience of both experts and non-experts. The event served as a reflective moment in which the outcomes of the information experiment were presented and reflected upon. Exchange of perspectives and knowledge was stimulated through the concept of collaborative learning.

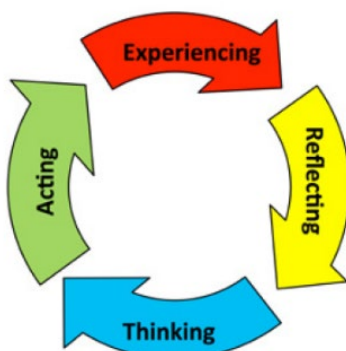
5.2 APPROACH

Concept

The concept of collaborative learning was used as a framework while designing the livestream. It stems from the field of educational sciences and departs from the notion that learning takes place in any social situation where two or more people attempt to learn something together. Within this broad application, two main perspectives are identified, the cognitivist and the constructivist orientation (Van Mierlo & Beers, 2020). For the joint learning event, we followed the constructivists' take. This states that the social group is the starting point for the learning process, rather than the learning individual. "In this process, people iteratively voice their own understandings, interpret other's contributions, and negotiate a new, shared understanding of a learning task (problem)." (Van Mierlo et al, 2020). Learning is therefore produced not just by the learning individuals, but also by the social context and interaction taking place.

At stake is the way in which collaborative learning is facilitated, and how communication can be influenced in order to produce specific learning outcomes. Van Mierlo et al. suggest 1) the teacher's role as a coach and 2) a scripted, pre-structured process in which the learning task can be completed.

Method



Following the teacher's role as coach and the importance of structuring the process, we decided on using the Experiential Learning Cycle (ELC) as a method. This method is mostly used as a template for creating educational programmes that actively involve learners in the process of learning. The ELC departs from the notion that learning starts with a shared experience, that is then reflected upon within the group. The thought process that follows, focuses on understanding the meaning of the experience. Finally, participants can apply the knowledge and insights gathered in their personal work or life context.

Experiential Learning Cycle, Kolb et al., 2018

Key to understanding this method is the notion that participants are both receivers and creators of information within the cycle. "In the circle of learning, learners receive information through concrete experiences and transform it through reflection and thinking and then transform it again through their actions to change the world." (Kolb & Kolb, 2018).

This has as a consequence that the teaching role should match the dynamic learning process. The

authors distinguish four different educator roles (coach, facilitator, evaluator and subject expert). The roles are not set in stone and a teacher may adapt all of them to some extent.

For the joint learning event, we decided that the role of facilitator would be most fitting. The facilitator “creates personal relationships and dialogue” (Kolb et al, 2018) and emphasizes ‘inside-out’ learning, i.e. personal knowledge and motivation. The teaching ‘style’ is described as warm and affirmative, in order to establish trusting relationships with learners.

Tool

The choice for a hybrid livestream stemmed from practical reasons (Covid-19 measures limiting the possibility to physically meet with a large number of people), but allowed for a convenient way to invite a wide variety of people. We investigated the possibilities of the livestream as a medium, e.g. the use of polls, hybrid dialogues and presenting. These were incorporated in the program.

5.3 PROGRAMME DEVELOPMENT & ROLE DIVISION

Program

See [Appendice chapter 23.1]

- **Kick-off: thematic quiz**
Following the ELC method and using some of the tips by Kolb et al., the livestream was intended to open with a brief, attractive start, involving the whole group and provoking thoughts on the topic by means of a short quiz for all participants.
- **Round 1: mini-lecture, presentation of research results & reflection by expert**
In the first round, we intended to create a more level playing field by providing a theoretical base through a mini-lecture. Having set the context of the research, the presentation of the results would be better understood and appreciated. Following the ELC, we invited Bart Vonk to reflect on the results. Between these the mini-lecture, the presentation of results and the reflection by the expert, we invited the audience to respond or ask questions.
- **Round 2: paneltalk**
After a short break, we intended to stimulate the collaborative learning process by means of a paneltalk between experts and local inhabitants of Kloosterzande. Following the need for structuring the communication, we developed three statements, based on certain scenes from the documentary. See appendice 22.2 for the statements.

Role division

Ilse Ubels	Presentation of research results
Remy VanderBroeck	Quizmaster and mini-lecture
Harmen Tempelman	Host and moderator during paneltalk
Nina Meijer	Host and moderator during paneltalk
Shashika Wedage Don	Quizmaster, online moderator and technical assistance

5.4 RESULTS

The livestream attracted more than 50 participants, both experts with various expertise as well as interested citizens. Despite some technical difficulties at the start, most of them stayed for the entire programme. The event is considered a success by the project group. Multiple positive messages reached us after the event, stating they enjoyed the program and the way we approached the topic.

5.4.1 Paneltalk

During the paneltalk, two statements were introduced by showing a clip from the documentary to get a conversation or even discussion going. Both the experts and citizens of the region would get a chance to speak up and share their perspective on the case.

The persons actively taking part in this discussion:

- Harmen Tempelman Facilitator project FRIEP
- Nina Meijer Facilitator project FRIEP
- Robert Asselman Board member village counsel Kloosterzande
- Tjarda Schakelaar Board member village counsel Kloosterzande
- Bas Kolen Director HKV water research and advise office
- Corry Brand Communications advisor Safety Region Zeeland
- Ludolph Wentholt Researcher STOWA
- Loes Witteveen Researcher HVHL
- Bart Vonk Senior advisor waterworks RWS
- Marcel Matthijse Program manager Safety Region Zeeland

Besides this wide variety of people and expertises, a number of the other participants were reacting during the talk. We selected several quotes of inhabitants and experts (these are translated from Dutch to English).

Statement 1

Introduced by Rutger Blok from Rijkswaterstaat claiming precise measurements of water levels are possible now.

“Advanced technology has caused more trust among citizens what resulted in them taking less reasonability to prepare for floods”

1:17:38 Inhabitant TS: “Technology has evolved a lot and taken out a lot of guesswork. I remember just looking at the height off the masts of ships to indicate the level.”

Expert BK 1:18:22- 1:19:56: “I doubt if the 5cm margin is feasible, especially when looking at the evacuation situations we are talking about” “When talking about storms like these it is already difficult to predict if the enter land in Groningen or Zeeland, so that will mean a much larger fault margin.” “A danger is we get to reliant of these technologies”...“it will always be an estimation”...“The technology isn’t the problem, it’s a bless, but the communication about this creates the largest risk”

Expert BV 1:19:20 – 1:22:19: “Par example in 2013 there was the Sinterklaasstorm, we could predict this 2 weeks in advantage there was something protentional dangerous coming. But for a long time, till 2 days before it would hit, it was thought the storm would hit in southwest Netherlands, but eventually it hit Northwest Netherlands with full force” ...“besides this we were lucky, because it hit 6 hours late and didn’t come together with springtide” “Nobody noticed this

was more luck than a good prediction” “The predictions are just a tool, what matters is we have experts that can interpret this data in the right perspective”

Inhabitant RA 1:23:00 – 1:23:30: “In the Western Scheldt the water gets pushed up along the sides, something that has to be taken in account when predicting the waterlevels and I can imagine is difficult to predict”

Summary

This indicates inhabitants having quite some trust in the predictions being done. According to the experts speaking in this part, these prediction technologies aren't the holy grail when it comes to these specific dangerous situations. After the experts have talked, the inhabitants can relate to the errors in events within their own life.

Statement 2

Introduced by Jan van Kranenburg describing the comprehensiveness of an evacuation.

“An unnecessary evacuation causes a lack of support for the next possible evacuation and has to be postponed till the latest moment possible”

Inhabitant TS 1:26:30 – 1:27:25: “It is a good thing the advice is given from the governmental standpoint” “I'm especially worried for people that are dependant of care, this should be the first people to be evacuated”

Inhabitant RA 1:27:29 – 1:28:17: “If you see in Walsoorden the difference of around 3 to 4 meter. This makes quite a difference when flooding”

Inhabitant RA 1:28:20 – 1:28:15: “I do have trust in the government giving the right advise, I have faith in emergency communications that have a good overview of the circumstances in the area”

Expert LW 1:28:41 – 1:29:44: “I think this is an interesting statement, Evacuation is seen as an absolute option here” ... “when looking at a river flooding you can see it coming multiple days in advantage, a flood from the sea is even for experts with their tools difficult to predict” ... “In 1953, most people died because they were fleeing the area, not because they stayed in the area.” You have to have a clear strategy when conducting an evacuation, no matter what option is chosen by the safety region”

Expert CB 1:23:00 – 1:30:58: “Communication is an important topic during but also before disaster strikes” The media also has a role in this, this creates an increasing feeling of concern among inhabitants that causes people to evacuate or prepare by themselves.”

Inhabitant RA 1:31:05 – 1:31:42: “Yes that sounds quite relatable to me, if I look at places community buildings are placed, most of them are on lower ground, probably some of the worst places there are” ... “This already rules out this strategy for evacuation”

Inhabitant TS 1:31:43 – 1:32:08 “I do not totally agree on you with that. There are of course churches in the area that are built on the highest ground” ... “I think these could serve as a safe place to go”

Expert LWI 1:32:21 – 1:35:01 “unnecessary evacuations don't exist, when the choice is made to evacuate this has legitime preconditions” ... “In 1992 the river region was partly evacuated without any disaster striking. Afterwards the focus wasn't on what had gone well, but at what had gone wrong” ... “This is also why this is evaluated afterwards, what could go different the next time”

Expert BK 1:35:25 – “Nice speech about “unnecessary”” ... “The decision is indeed made when there is a thread, so nothing is sure yet” ... “These mass evacuations don't happen often in the Netherlands, most persons in flood prone areas maybe have to do this once in their life, so there is no real issue with support” “As the research also gives as an answer” ... “Another thing I found interesting is the believe in procedures. There is one subject that doesn't work with them, that's nature itself” “Decisions are made with the data that's available and need to be made on high levels from the start of a crisis.”

Expert CB 1:28:30 – 1:39:35: This is something that will happen from the start of a thread, crisis teams are formed on the scale of the disaster” ... “I still think it is good to mention the platform all of this comes together “Zeelandveilig.nl”.

Expert MM 1:39:55 – 1:41:06: “I want to give you a compliment, for the documentary itself, but also for the whole research, we as the safety region are really interested in the results of it.” ... “I think as mentioned before, we are dealing with nature forces that are difficult to predict, the question shouldn’t be if we go and evacuate, but we just need to do it when the decision is made and don’t start a discussion about it as we always tend to do in this country”

Summary

The inhabitants have their doubts about leaving the area as soon as possible, because they feel like other some people need more time to leave the area. Experts agree on this topic and state it isn’t as black and white, but when there is no decision made inhabitants will go their own way and there is no possibility to coordinate this. That would result in more casualties.

5.4.2 Chat discussion

Besides the verbal discussion on teams, the chat was also actively communicating. It was nice to see experts commenting on each other from other perspectives. An example of this would be “but what if mistakes are made in predictions?” Answered by an expert with: “That’s why it is so important to keep mentioning it isn’t sure yet, it is a prediction with a fault margin”

5.5 REFLECTION & CONCLUSION

Concerning the development of the program, the method of ECL proved very helpful, in the sense that we tried to put the emphasis on (shared) experience, which is not evident when using a livestream as a tool. The need for a structured communication became most visible in the paneltalk and gave a boost to the conversation. Finally, it helped us consider and practice a suitable role as ‘facilitators’.

The livestream stimulated engagement, reflection and thoughts on the topic and the research results. We did not assess as to what extent the collaborative learning had taken place, but the excerpts of the paneltalk provide a general insight in the attempt made by the actors to learn from each other. Although the experts were most verbally present, the discussion was followed by a number of non-professional persons, showing interest among citizens.

This interest also spoke from the amount of registrations (50) we received for the event. It has opened our eyes to the apparent desire among both professionals and non-professional citizens to engage with the topic, exchange perspectives and learn (individually or collaboratively).

6 FINAL DISCUSSION, CONCLUSION & ACKNOWLEDGEMENT

6.1 DISCUSSION

Regarding the process, we can state that the holistic approach, i.e. to include a variety of stakeholders during different phases of the research, monitor and adjust the artistic qualities of the documentary and facilitate joint learning, have added to the overall quality and impact of the research. Furthermore, we experienced how the film-making sparked interest and engagement among the stakeholders we contacted and invited to collaborate or participate. This indicates that

the documentary was not only successful in terms of its impact, proven during the information experiment, but also in terms of the participatory qualities. The documentary can therefore be regarded as a communication tool in the broad meaning of the word, in the sense that it has also been a tool for participation and connecting various (professional and non-professional) stakeholders.

Critical remarks can be made about each aspect of the research process:

- The network analysis, although elaborate, has not been verified by the stakeholders involved.
- The documentary could have included more perspectives, e.g. the mayor, local inhabitants etc.
- The monitoring was not executed in a simultaneous manner and produced data in different shapes, that has made it difficult to compare the results of each monitoring moment directly.
- The group of people participating in the information experiment could have expanded.
- The joint learning event has not been assessed as to what extent collaborative learning was successful.

All of these gaps in the research were primarily due to the limited timeframe in which they had to be organised and executed.

We look back on a sometimes challenging, most times energizing project, in which we were provided with a sturdy, multifaceted topic and a safe and encouraging environment to develop our skills and grow as Facilitators of Change.

6.2 CONCLUSION

The goal of this research has been to find out whether a documentary is a feasible and effective intervention tool to use in flood risk communication and thus serve to contribute to reconnecting flood risk management and society. To this aim, an experiment was designed and conducted. The research departed from the following research question:

What are the effects of the documentary as an instrument to influence the risk perception among the inhabitants of Kloosterzande and surrounding areas, in case of an imminent flood where preventive evacuation is no longer possible?

Regarding answering the research question, we concluded that the information experiment has proven the modest effectiveness of the documentary 'Als de dijken breken, hoe goed ben jij dan voorbereid?' Specifically, the documentary has an influence on the attitude towards "shelter on a higher floor" "shelter in a community centre" and partly on "fleeing". This also accounts for the intentional behaviour.

Essential for the documentary to generate the desired effect, is first and foremost the active involvement of stakeholders in every phase of the development. Secondly, an accurate and realistic floodscenario should lie at the base of the narrative. Thirdly, we recommend that attention should be paid to the process of viewing: broadcasting the documentary should preferably be followed up with a moment of reflection and dialogue between stakeholders.

As future Facilitators of Change, we therefore stand by the belief that developing a documentary can have an influence within the transition from emphasis on flood prevention policy towards a more crisis-adaptive society, provided that it is not merely used as a communication tool, but its participating qualities are also valued.

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