Creeping Towards the Red Light

An Exploratory Study to Detect the Tipping Points of a Creeping Crisis

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An Exploratory Study to Detect the Tipping Points of a Creeping Crisis

by

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TU Delft

Preface

When I started an internship at Veiligheidsregio Zuid-Holland Zuid over a year ago I did not foresee that I would find a thesis subject there that I would be able to graduate on. However, while working as an intern I discovered the diversity of the tasks of the safety regions and the relevance of these tasks. Over the course of the first internship of five months I learned a lot about the world of fire services and of crisis management. I found the organization to be very welcoming and the field of risk monitoring to be very interesting. So much so that I wanted to stay and conduct research on that topic.

I was very lucky that Haiko van der Voort and Nazli Aydin were also interested in the research I proposed and wanted to supervise me. I want to thank Haiko for his support, encouragement and critical questions. I would also like to thank Nazli for taking the time to answer my questions and give me advice.

The Veiligheidsregio Zuid-Holland Zuid has been a great place to work. I want to thank the colleagues I have worked with the past year for their contagious passion, their interest in what I was working on and their encouraging words. Above all, I want to thank Jonas van Stam for his enthusiasm and willingness to discuss all my questions. All respondents I talked to for an formal or informal interview have helped me out greatly. I really appreciate their input and the time given.

Lastly, I am grateful to my family and friends for their encouragement, for their patience, for their willingness to listen to me explaining creeping crises over and over again and for their feedback on draft versions of this thesis. Thank you for your kind support.

Marte Treurniet
Delft, March 2025

Summary

A creeping crises is a relatively new type of crisis compared to regular 'flash' crises. This new type of crisis does not start 'out of nowhere' with a fire or explosion. It builds up over time and slowly manifests itself. For the Dutch safety regions, that deal with disasters and crises daily, this is new terrain. The COVID-19 pandemic was their first large scale encounter with this type of crisis. For them it raises the questions *when do we act* and *how do we act*? While in flash crisis situations they start acting when the emergency control room receives a call, in a creeping crisis situation there is no clear start and no call to the control room can be expected.

In academic literature, the creeping crisis is quite a new concept as well. The focus of the literature is on the strategic or governance perspective on this crisis. This perspective is useful for policymakers that encounter these crises as this perspective looks at ways to prevent a creeping crisis from building up in the first place. The safety regions, however, are more focused on a tactical level, they do not make policies. The safety regions only start dealing when a crisis reaches the 'hot' phase, when it cannot be prevented anymore. This raises the following research question *What detection approach could help the Dutch safety regions in detecting the tipping point of a creeping crisis when the creeping phase becomes the hot phase?* as the moment the hot phase starts is not as obvious as with flash crises. This question is answered through literature studies, interviews and an exploratory data analysis.

Firstly, the creeping crisis is defined through informal interviews and studying literature. It is found that existing definitions are not completely applicable to the tactical perspective of the safety regions. A list of characteristics of the threat is formulated. These characteristics, like a lack of time pressure, a long incubation period and uncertainty about the acuteness of the response, all define the threat of a creeping crisis. Some of these characteristics are the cause or the effect of other characteristics. They can be summarized by the following description: *A creeping crisis is a threat to one or more vital interests of society for which there is uncertainty about the nature of the threat, about the buildup of the threat and about the end of this buildup.* This description shows the complexity of the detection of the tipping point at the end of the creeping phase through the focus on 'uncertainty'.

This complexity plays a key role when finding which approach could help the safety regions detect the tipping point. The approach should be able to deal with the complexity of the creeping crisis. Through informal interviews four approaches are found that make use of *continuity*, *thresholds*, *scenarios* and *patterns*. Each of these approaches reduce the uncertainty around a creeping crisis in a different way. The first and third approach affect the uncertainty of the tipping point in an indirect way. The other two in a direct way. To make a more informed choice of an approach, the criteria *understandability*, *usability* and *robustness* are also taken into account. These criteria show that the approach has to be usable by the safety regions and that the approach should be scalable to a multitude of creeping crises. The choice is made to make use of the approach that uses thresholds. This approach is very intuitive as it looks at factors that make up a crisis. Once a set threshold is reached by these factors, this is a sign of a tipping point.

For empirical grounding, this chosen approach is tested. For this, a case study is conducted. This studied case is the Dutch 2021/2022 refugee crisis. Through interviews with respondents that are concerned in the matter, a time line is created, tipping points and factors are found. These factors, like *inflow*, *occupancy* or *outflow*, are the input to the chosen approach, in order to test whether - with the use of this approach - the same tipping points can be found as found in the interviews. This is not as straightforward as the approach implies. However, when reducing the amount of variables, the data shows a similar story as the found time line.

It is concluded that the approach that makes use of thresholds could help the safety regions detect the tipping point of a creeping crisis. However, a lack of data and of respondents make it more difficult to draw conclusions. It is recommended to the safety regions to start monitoring in order to collect more data and to decide whether action needs to be taken during the creeping phase. Besides, further

research would need to be conducted to test out this approach on other cases and see how to implement this approach in reality. It is recommended that more research is conducted to the use of scenarios for sense-making at the end of the creeping phase. Finally, more research can also be conducted to the use of patterns when it comes to the start of the creeping phase.

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Introduction

Over a decade ago the Dutch safety regions were created out of the municipal fire departments. The crises that had to be encountered were getting more and more complex and it was thought that larger, regional organizations would be able to better prepare for this. These safety regions have to be prepared for many different crises: on water, rail and road, fire in old city centers or flooding. The last few years they also had to deal with the COVID-19 pandemic and the refugee crisis. These two crises are examples of a different type of crisis: the creeping crisis. A more 'common' crisis like a big, complex fire at a chemical plant is abrupt, is an obvious crisis and has a clear beginning and end. There is a clear 'hot phase' and 'cold phase': a crisis is happening or nothing is happening at al. Creeping crises have an added phase: the creeping phase, not hot or cold but 'lukewarm'. During this phase the safety regions do not act (yet), but might have a gut feeling something is coming. But when does lukewarm become hot? When to act? How to act? When does the creeping stop and the crisis begin? Who should be responsible for dealing with this crisis (Boin, Ekengren et al., 2021; Groenendijk & Van der Krol, 2024; Van der Varst et al., 2022)? Based on what evidence should a crisis be declared (Boin, Ekengren et al., 2021)?

Right now there is no approach to deal with these questions. Decisions are made based on gut feeling. In order to try to develop a approach that is more information based, one of the safety regions, the safety region South-Holland South (Veiligheidsregio Zuid-Holland Zuid, hereafter: VRZHZ), has done a pilot on the creeping crisis of PFAS, as Chemours, a chemical company that emits PFAS, is located in the region. With this pilot, a system is developed to monitor the crisis in order to be able to act on time when things get out of hand. However, this monitoring system is very time-consuming for the parties involved, these parties might not feel the urgency to put in the time and the system still partly relies on the gut feeling of the VRZHZ and its partners. There is no approach of monitoring yet that can be used on a bigger scale.

As society becomes more complex creeping crises will have to be dealt with more often (Van der Varst et al., 2022). Every four years all safety regions are obligated by law (Safety Regions Act) to draw up a document describing the risks that can be found within their region. Looking at this document from the VRZHZ for the upcoming four years, multiple risks have to do with creeping crises like climate change, societal polarization or geopolitical tension (Zonderop et al., 2024). Wolbers et al. (2021) also see a rise in the amount of creeping crises. Besides these trends, the Ministry of Justice and Security stresses the importance of preparedness (Ministerie van Justitie en Veiligheid, 2024-a) and Van der Varst et al. (2022) point at the importance of monitoring and the use of data.

The Netherlands institute for public safety (Nederlands Instituut Publieke Veiligheid, NIPV) does research to support the 25 safety regions. In their online research database only one study can be found that solely focuses on the subject of creeping crises. This study looks at strategic leadership in the context of these crises (Tolsma, 2021). Dückers (2023) focuses on the societal impacts of creeping crises. He acknowledges it is a very new research area, though there is a lot of attention for it from organizations. Boin, Ekengren et al. (2021) also conclude a lot of research is still to be done as they

have conducted multiple case studies to make the subject less abstract. These studies were done from a societal and policy perspective. However, the case studies do not shed much light on when to act. Boin et al. (2020) conclude their conceptualization of the creeping crisis by posing practical questions about the detection of the crisis, the timing of the response and the way of responding.

This thesis will try to find a data-based approach to detect and/or monitor a creeping crisis in order for the safety regions to be prepared, to be able to act timely. A timely response will help create a safer society. This approach will also help to make more information-based decisions instead of decisions solely based on gut feeling. In order to design research that is relevant and novel, this introductory chapter will first give some context to the issue, than analyze a research gap. This gap will be used to formulate a research question that will be answered in this thesis.

1.1. Context

This thesis was not developed in isolation. This thesis was written as a result of an internship of six months. This internship comes with acquired knowledge about the context of the issue described in this chapter. This section lays down background information learned during the internship that helps understand what this issue means in practice.

1.1.1. Safety Regions

Around the start of the 2000s two big fires hit the Netherlands: an explosion in Enschede caused by a fire at a fireworks storage and a fire in a cafe full of young people in Volendam on new year's eve. These two disasters showed an increasing complexity in firefighting and difficulties with multidisciplinary coordination. At the time, the fire departments were organized on municipal level. Every municipality had to take care of their own fire department. This was a useful structure as the fire departments were, and still are, dependent on volunteers: people who, besides doing their 'regular' job, could be called upon whenever an incident occurs. In smaller towns with fewer incidents this structure is the only way the fire services can be organized. In bigger towns with more incidents and more finances this structure is often combined with a group of 'professional' firefighters who are on call 24 hours a day at a fire station. Both types of firefighters are highly trained and skilled for their job. However, the volunteers are unable to get to the firetruck within one minute. Besides, in bigger towns with incidents happening every few hours it would be unpractical to call volunteers away from their regular job every single time.

These volunteers need to be recruited. In order to do so they need to have the motivation to be a volunteer besides their regular job, their family life and their other duties. Therefore, it is crucial to bind these volunteers to the organization of the fire department. This bond needs to be strong for the volunteers to want to keep volunteering. The importance of this bond shows the usefulness of the municipal level of the fire department. It is much easier to connect with local residents on a local level than on a national level. However, the increasing complexity of the fires as shown by the two disasters and the growing risks in our day-to-day lives asked for a bigger organization. Besides this, multidisciplinary crisis management was organized on a municipal level as well, as this task was mainly the job of the fire departments. There was a need for a more structured and organized approach. This need for a bigger and more structured organization introduced the 25 safety regions. These regions where a nice compromise between the need of a bigger organization and the need to keep a bond with the local volunteers. Besides, the idea of these specific 25 regions was that it would match the plans to regionalize the police. However, in the end the regionalization of the police has been further pursued and the police has organized itself in 10 regions.

After a few years of transition to shift the organizational structure, all 25 regions were in operation by 2010. The tasks and mandates of these regions can be found in the 2010 Safety Regions Act. Here it is decided that the regions are a collaboration of the municipalities within the region. The mayors of the municipalities make up the board of the safety region. In this act it is also found that the regions have multiple jobs: to map the risk of fires, disasters and crises; to advice the authorities on these risks; to advice the municipalities on the job of the fire department; to prepare for firefighting and to organize disaster relief and crisis management; to organize the fire department; to organize the GHOR (Geneeskundige Hulpverlenings-organisatie in de Regio / Regional Medical Relief Organization); to provide for an emergency control room; to take care of common equipment; to set up an information

structure within and between the different tasks of the safety regions.

These nine tasks typically lead to a few different departments within the organization of a safety region. It is important to note that every region is organized slightly different according to what works best for the specific region. The explanation here can be seen as an example. One department takes care of the fire services. This department makes sure that there is enough staff to deal with the incidents, that the staff is well trained, that they have the equipment to do their job and that all digital tools work. Another department focuses on risk management. This is the department that advices about prevention or minimization of the impact of incidents. Every four years the safety regions have to draw up their own regional risk profile. In this document the highest risks for the region with their likelihood and impact are described. These risks range from pandemics, to extreme violence, to fires in buildings with vulnerable residents. This plan is used as a guide to point out the issues that require attention and as a starting point for a regional crisis plan and a policy plan. A third department, the department of crisis management is set up for the cases when big risks are not prevented and a disaster or crisis takes place. During these incidents the different disciplines have to work together to prevent further harm. This requires the organization to be prepared for these events and professionals to be trained to be able to work together across disciplines. The organization of the GHOR differs greatly between each region. The GHOR is the regional medical relief organization. This organization coordinates and leads the health care during a crisis or disaster. For some regions the GHOR is a separate organization that the safety region works with and for others it is embedded within the organization of the safety region.

All these tasks and departments have the same goal: a safer society. To achieve this the safety regions are constantly changing to account for a changing world. Besides, these regions are still quite young organizations and are still finding the best ways to accomplish their tasks. Over the last few years there has been a shift to focus more on the last task as mentioned in the Safety Regions Act: the information management. This has led the safety region to try to be more data and information driven. This can be seen in the job of the fire departments, where more data is collected to try to find trends of different fires and to try to predict the size of an incident the moment the first calls reporting the incident come in. However, the biggest signs of the shift to being more information driven can be found in the VIK. Most safety regions are currently setting up what they call a safety information network (Veiligheidsinformatie knooppunt – VIK, also called Veiligheidsinformatie centrum - VIC). This VIK combines data from within the organization and data from partners to be able to monitor the situation in real time.

Often this VIK is combined with the emergency control room. This control room is a shared control room where the fire department, ambulance service and police execute their control room function. Almost no region has its own control room. The regions work together when it comes to the emergency control room. Therefore most control rooms are a collaboration of two or more regions. In the control room all calls to report incidents within the region are answered and processed. One person has the role of calamity coordinator (CaCo). The CaCo is responsible for the multidisciplinary process in the control room, and for starting the regional multidisciplinary escalation process, as can be found in appendix A, in case of crises and disasters. The CaCo has the task to coordinate the communication between the different disciplines in the control room during a crisis. This way, the emergency services that are dispatched by the staff from the different disciplines in the control room have all information they need. In the control room there is always a CaCo present, 24/7, even when there are no incidents that ask for coordination. Some safety regions have decided to intertwine the roles of the VIK and of the CaCo. The CaCo already had the job of monitoring the situation in the emergency control room. Meanwhile the VIK has the job of monitoring the situation in the region in real-time. These two jobs can relatively easily be combined. Therefore, some safety regions want the CaCo to also pay attention to the data coming in to the VIK.

The Tactical Level of the Safety Regions

The safety regions operate on different levels. Luesink, Bakker et al. (2024) see three perspectives: strategic, tactical and operational. This is also visible in appendix A. When it comes to 'regular' incidents that require no multidisciplinary coordination, the safety regions operate on an operational level. This is a very 'practical' level. The emergency services are on site dealing with the incident: preventing or reducing harm. Once multidisciplinary coordination is needed, the level might change. This is the case when incidents get bigger and become crises. As can be seen in appendix A, at the first level of crisis, the safety regions still operate on an operational level. However, once the crisis starts affecting people

outside of the incident area, the tactical level is introduced. This level does not focus on fighting a fire or saving people from a car crash. This level tries to reduce the effects the crisis has outside of the crisis area. This can be the effects of (toxic) smoke on a neighborhood close to a fire or when multiple buildings need to be evacuated (Veiligheidsregio Fryslân, n.d.). The strategic perspective can be seen as the perspective from the mayors within the safety regions. This perspective is added during major crises when many residents are affected. The strategic perspective focuses on how to deal with the effects on society, on the administrative perspective and on policy.

1.1.2. Creeping Crises

Besides a shift within the safety regions being more information-driven, there is a change in the types of crises they have to deal with. The structure of safety regions is built on dealing with 'flash-crises'. These are abrupt, acute crises. These crises, like an explosion or a fire, have a sudden onset and ask for immediate attention from the emergency services. These flash-crises could be very complex crises, but there is always a very clear beginning, a tipping point when the crisis starts. The way the safety regions deal with these crises can be found in appendix A, where a distinction is made between the strategic, tactical and operational level. The COVID-19 pandemic has introduced the safety regions to a type of crisis that is very different to the flash-crisis: the long-term crisis. Where flash-crises generally do not last longer than a few hours or, in the worst case, a few days, a long-term crisis can last more than a year. This type of crisis comes with an issue for the safety regions as the regular crisis structure is unsuitable for the long-term. It is practically impossible to be in 'crisis mode' for such a long time.

Closely related to the long-term crisis is the creeping crisis. This is a crisis with no clear start. This type of crisis has also been introduced by the COVID-19 pandemic. It is impossible to pinpoint the moment when the COVID-19 crisis started: at the first known case, the first known death or at the first untraceable case? This is a challenge for the safety regions that have always been responsive organizations. A call to the emergency control room used to be the trigger to jump into action, with a creeping crisis this is impossible. A creeping crisis asks for proactivity. Besides, practice has learned that creeping crises also differ from flash-crises in their nature: creeping crises are often more societal crises. This raises the question whether dealing with these types of crises is even a task of the safety region. Regardless of the answer to that question, which is outside the scope of this research, the creeping crisis comes with political complexity. A creeping crisis has been able to build over time because of political inaction. This inaction adds complexity.

Safety regions come into play when a situation is a crisis. With a fire or explosion this raises no questions. When the start of a crisis is less clear this comes with difficulties. The responsiveness is no longer an option. The safety regions will have to act at the moment the creeping crisis becomes a crisis. It is impossible to just 'wait and see', as acting too late might do a lot of harm. To point out when a creeping crisis becomes a crisis, the safety regions will have to look ahead and monitor the situation in advance.

The difference between the flash-crisis and a creeping crisis becomes visible when illustrating them. When it comes to the flash-crisis the terms 'hot' and 'cold' are often used. The hot phase is the crisis phase. The cold phase is the time period when nothing happens. In the graph in figure 1.1 below the hot phase is illustrated by the color red, the cold phase by the color green. Of course, this graph is only an illustration as in reality a threat has more dimensions than are visible in a two-dimensional graph.

This graph in figure 1.1 shows the threat-level over time. For some time there is no threat: we are in the middle of the cold phase. Next, something happens and a disaster or crisis occurs. The level of threat spikes and the cold phase turns into the hot phase. The moment when there is a change in phase, is a tipping point. The hot phase lasts some time, but once the crisis is dealt with, the hot phase passes and the cold phase takes over again. The length of the hot phase is not specified in the graph. This can last from a few hours to more than a day. For the completeness of the graph, the ending of the crisis is shown as well, however, this is outside of the scope of this research. The 'after'-phase of a crisis, the time when the threat is dealt with but the effects of the crisis still need to be handled, can last for a very long time: for days, months or even for years. However, this is a completely separate problem that might require a whole different thesis. Besides, the safety regions are generally not the ones in charge of dealing with the after phase, this is often a job for, for example, the municipalities, water authorities or utility companies.

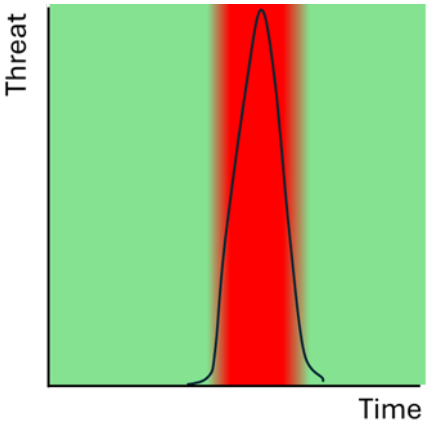

Figure 1.1: The threat level of a hypothetical flash-crisis over time

The important aspects that the graph in figure 1.1 shows is the abruptness of the start of the crisis, the clear tipping point, and the limited length of the crisis. The graph in figure 1.2 gives an illustration of the start of a creeping crisis. The graph introduces a different color: orange. Between cold and hot is the 'lukewarm' phase or the creeping phase. This is a phase when the threat builds up: a phase between cold and hot. During this phase it cannot be said that nothing is going on - the situation is not cold. However, it can also not be said that a crisis is fully happening - the situation is not hot.

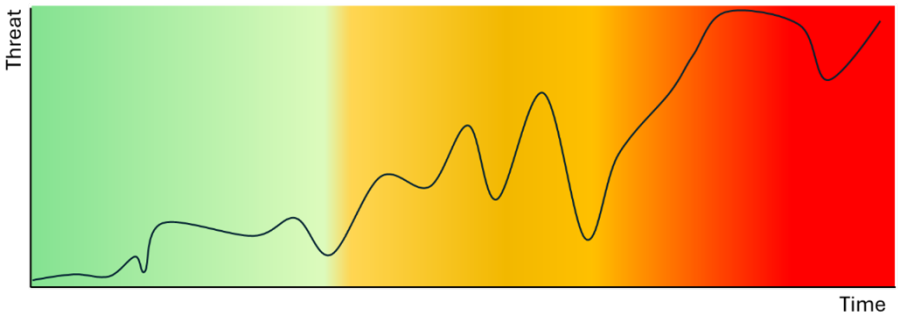

Figure 1.2: The threat level of a hypothetical creeping crisis over time

The graph in figure 1.2 again shows the level of threat over time. Again, this graph is only an illustration as the level of threat is multi-dimensional. In this graph, only the start of a crisis is shown as the hot phase and the after phase are outside of the scope and irrelevant to this thesis. The graph shows the level of threat building up over time. The building up of the threat is not a linear process. Sometimes the threat seems to die down while it rises again the next moment. The green, the cold phase, slowly turns into orange (the first tipping point), which in turn slowly turns into red (the second tipping point). The cold phase becomes the lukewarm phase, which becomes the hot phase. This thesis focuses on the tipping point between the creeping phase to the hot phase, therefore the moment where green turns into orange is irrelevant to this research. However, it is good to illustrate this moment as well.

The graph in figure 1.2 shows the complexities of this issue. The first complexity lies in the moment the orange turns into red. There is no rule that decides when this happens. How bad does the threat have to be for the creeping phase to turn into the hot phase? Besides, it might be relatively easy to decide and pinpoint this moment in hindsight, in the middle of it this will be much more difficult. The uncertainty of the crisis makes it impossible to look ahead. Is a rise in threat level temporarily or will the threat continue to grow?

This complexity ties into the second complexity. Because, when talking about threat level, what does this mean? With flash-crises the threat is often quite obvious: there is a fire, an explosion or a person or an animal is in need of help. With creeping crises the threat is less obvious and more complex. Combining this with the complexity of the tipping point increases the threat-issue. Not knowing what

the threat is makes it even more difficult to know when the threat is bad enough to call it a crisis. The complexity of the threat comes with the fact that there is a political element to the threat as mentioned before: the threat can build because of lacking political intervention. It could also be the case that political intervention declares a situation to be a crisis which would not be a crisis for the safety regions. This is new terrain for the non-political safety regions.

This political aspect also raises the question whether the creeping crises that was able to build because of a lack of action from policy-makers and politicians is supposed to be a problem for the safety regions in the first place. The fact that a crisis has been able to build up for maybe even decades could be attributed to a lack of political action. The safety regions are not the organizations that caused the crisis nor are the ones to be able to solve the root of the problem. However, the effects of the problem might affect the work of the safety regions. Would these effects make this crisis a crisis that the regions will be asked to deal with? This specific question is not a question that will be answered in this thesis. However, it does add complexity to the issue, therefore, this question needs to be mentioned and taken into account.

The Tactical Level During Creeping Crises

This political aspect shows how the tactical and strategic perspectives are very different perspectives on creeping crises. The strategic level and its perspective is the level where a creeping crisis can still be prevented before the creeping phase turns into the hot phase. This perspective is relevant during the creeping phase. It is about preventing the creeping crisis to develop further and solving the underlying issues. On a tactical level, the tactical perspective of the safety regions, this is not the case. The safety region, with its tactical perspective, only starts to act when the hot phase starts. During the creeping phase no action is taken besides maybe preparatory action. This creates dilemmas, as this inaction during the creeping phase causes the threat to develop further. Besides, once the hot phase starts and the safety regions start acting, they deal with the effects of the crisis. However, the causes of the crisis are left for other actors to be dealt with.

1.2. State of the Art

In order to find what the scientific literature says about an approach to detect or monitor the tipping points of creeping crises and to find where there are gaps in this literature, a literature study is conducted. The following search term has been entered in Google Scholar: “(”creeping crisis” OR ”sluimerende crisis” OR ”langdurige crisis”) AND (monitoring OR detection OR detectie) AND (”tipping points” OR ”omslagpunt” OR ”omslagpunten”)” A choice is made for Google Scholar as this covers all fields of study and creeping crises can appear in all these fields. The downside of Google Scholar is that it also includes research that is not peer-reviewed and that it bases its findings on earlier searches. Therefore, to get a broader view on the literature, the search term was also used in Scopus and Web of Science. Using the term in these engines gave no results. The search term includes English and Dutch search terms to find as many studies as possible regardless of language. The search includes detection as well as monitoring as approaches for monitoring might be useful for detection as well. 32 studies were found. Of this number five papers were not accessible and one paper appeared twice. Three results are all chapters from the same book so the whole book is taken into account. Eventually, eleven books and papers are included in this study. The papers that were excluded, were so for different reasons. For most papers the main reason was that the research was about a crisis that could be called a creeping crisis – therefore it appeared as a result to the search – but the research did not focus on the ‘creeping’ aspect.
The authors of the found papers and books have often conducted more research in the crisis management field. Therefore, the publications of these authors are looked through to see whether there is more relevant literature that was missed with the search term. Besides this method, the method of snowballing was used and recommended literature was looked through. With these methods five more studies were found.

1.2.1. Defining a Creeping Crisis

Both Boin et al. (2020, p. 122) and Boin, Ekengren et al. (2021, p. 3) use the same definition of a creeping crisis “A creeping crisis is a threat to widely shared societal values or life-sustaining systems that evolves over time and space, is foreshadowed by precursor events, subject to varying degrees of

political and/or societal attention, and impartially or insufficiently addressed by authorities." With this definition Boin, Ekengren et al. (2021, p. 5) see four dynamics:

- "the emergence and gradual development of threat potential, owing to interacting conditions over time and space;
- the foreshadowing of the threat through precursor events;
- the shifting nature of threat attention, amongst societal groups and public officials;
- the partial or insufficient response to the threat."

Seabrooke & Tsingou (2018) focus on the third dynamic when defining a creeping crisis. These are the crises without alarm, the more 'regular' situations without much attention. In most of the found studies one or more of the four dynamics from the definition by Boin, Ekengren et al. (2021) are mentioned.

1.2.2. The Emergence and Development of Threat Potential

Boin et al. (2020) and Head (2022) find that when it comes to the origin and development of this type of crises, the 'incubation period' can be very long, which allows the threat to build up and travel through systems unnoticed. Besides, Boin et al. (2020) see the development does not have to be linear. The threat will - sometimes slowly, sometimes quickly – grow towards a tipping point where the creeping phase ends and the hot phase starts. These tipping points are the last moment for intervention. The threat can go unnoticed and build up speed for a long time because of the complexity of the crisis (Boin, Ekengren et al., 2021). Because of this complexity even experts do not always notice the first signs of the crisis building up. However, Tolsma (2021) sees the long incubation period as an advantage for 'strategic crisisleaders' as it gives them time to try to understand the complex problem at hand. This is an advantage that can only be used when these crisisleaders notice the crisis in time.

1.2.3. Precursor Events

When it comes to precursor events, they can be seen as a distraction as people would much rather focus on smaller manageable threats than on the events they foreshadow (Boin, Ekengren et al., 2021) and with that these events might be seen as the problem instead of a symptom (Boin et al., 2020). However, the precursor events can also be used to put the underlying problem on the agenda (Pot et al., 2021). When it comes to these events, hindsight bias comes into play. De Bruijn (2007) shows there are different cases in which in hindsight there were clear foreshadowing events that at the time of the crisis could logically be explained differently. These precursor events naturally did not lead to action. Besides, situations could also be called a crisis while in hindsight it is concluded that they were not.

1.2.4. Threat Attention

There are two sides to attention to threats. Boin et al. (2020) point out that without political attention intervention and early detection are unlikely. As long as the crisis is not detected it will stay alive and keep building. Attention is necessary for action (Tolsma, 2021). The positive side to this is that recognition increases attention and when public attention builds up it might reach a tipping point that demands political attention (Boin et al., 2020). Head (2022) also sees a tipping point where awareness becomes action as the more awareness there is, the more parties involved will be inclined to act. However, the public gets bored quickly (Boin et al., 2020) and the long period makes it difficult to gain and keep attention (Boin, Ekengren et al., 2021, p. 174; Tolsma, 2021; Head, 2022). Beamish (2002) points out it can take very long for people to notice a threat. Besides, policymakers might be unwilling to recognize a crisis for political or cultural reasons or because they do not want to have to deal with it, as the person who recognizes the crisis might be blamed afterwards (Boin et al., 2020). To add to this, policymakers can only pay attention to a limited amount of problems. Crises have to fight for attention. It is not always a matter of unwillingness from policymakers but a matter of priority, this is especially difficult as the effects of a creeping crisis are not yet visible during the creeping phase. Sætren et al. (2023) see that situational awareness is tied to time and space. However, during a creeping crisis people's perception of the time and space of the crisis – and with that their awareness – is not always correct. It is necessary but difficult to capture and maintain people's attention. Boin, Ekengren et al. (2021, p. 174) and Tolsma (2021) see this is something leaders will have to learn. Tolsma (2021) goes further and argues leaders also need to decide whether a problem can be called a creeping crisis, who should

fix it and when action should be taken. The focus here, is on strategic leaders. Tolsma (2021) does not look at operational or tactical leaders. Besides, the research does not go as far as to decide how these decisions should be made, only that this is tied with a sense of urgency within society. When it comes to attention for creeping crises there is a risk of warnings not taken seriously. Not all creeping crises leave the creeping phase to turn into the hot phase. If a lot of attention is demanded during the creeping phase which turns out to be 'unnecessary' as the crisis dies out, the public might not take this attention seriously the next crisis. This attention might also cause the term 'crisis' to lose its value.

1.2.5. Partial or Insufficient Response

When it comes to responding to a creeping crisis, Boin, Ekengren et al. (2021) see the risk is too great not to act, even if most of the creeping crises might never develop into a hot phase. They mention insufficient response can speed up the threat and can possibly turn the creeping crisis into an acute crisis (Boin, Ekengren et al., 2021) so delayed response might have bad consequences (Head, 2022). However, when societies or officials respond, Rosenthal et al. (2001) see a risk of overreaction to compensate months or years of no response. Here, hindsight bias comes into play again as it is quite easy to point out all 'wrong responses' in hindsight (de Bruijn, 2007). Besides, the risk of creeping crises being too great not to act as mentioned by Boin, Ekengren et al. (2021) does not take into account the reality of politics and policymakers. Policymakers can only pay attention to solving so many problems and (unnecessary) reaction to every potential crisis might decrease credibility. In their research about the reaction of hotels on the COVID-19 pandemic, Paraskevas & Guix (2023) conclude the response to a creeping crisis is determined by the amount of information available. Meanwhile Boin, McConnell et al. (2021) find that imagination plays a big role in the way governments reacted to the COVID-19 pandemic. The governments that had not had to deal with a pandemic for a long time – mostly European and North-American countries – thought they were prepared for it. They were not able to imagine the consequences. Boin, Ekengren et al. (2021) also see a role for imagination as governments might not want to see the threat, as they cannot imagine it, or might not want to react to it, for political reasons. Besides, they raise the question who should be the actor to respond to a crisis and what evidence should be used for this response. Pot et al. (2021), however, are more optimistic as they do see ways and reasons for governments and politicians to turn signals into action: because of political responsivity or by institutionalizing plans to look ahead. At the same time, they do see that a lack of urgency can push away the ability to look at the signals, that a solution being available is necessary for action and that investment in dealing with a creeping crisis might not be possible in an electoral system with a time span of four years.

1.2.6. Approaches

While most researchers focus on the theory behind creeping crises, a number of studies point out approaches to help detect or act on these crises. Boin, Ekengren et al. (2021) call for development to identify threats. There are three types of approaches mentioned. Räisänen (2024) puts focus on the role of imagination as mentioned in the previous section. This study finds that the more imaginative the approach, the better policymakers will be prepared for complex crises. The study looks at simulation exercises in which policymakers will face uncertainty. Opposed to this, Boersma et al. (2020) put focus on the role of information from the previous section. They see data was used at the start of the COVID-19 pandemic for 'sensemaking'. Comes et al. (2022) also see the importance of data as they argue data analysis can help spot early-warning signs. Boin & de Graaf (2022) mention the approach of data-analysis as well. In this case this approach is advised to be used by the Dutch police to monitor the creeping crisis of 'subversion'. Lastly, Wolbers et al. (2024) look at the use of scenario planning to make sense of a crisis. During a creeping crisis this approach can be combined with data for risk calculations.

1.2.7. Knowledge Gap

The found literature mainly focuses on creeping crises from the perspective of policymakers. For the safety regions there is a gap between this focus and their tactical and operational field of work. While most literature looks at ways to prevent creeping crises from happening, the safety regions want to find ways to react timely when the creeping phase turns into a hot phase. This tactical perspective is not taken into account within the found literature. As found in section 1.1, the safety regions do come into play in case of a creeping crisis. However, from their tactical perspective they only act when the hot

phase starts. The found literature, with its focus on policy and governance, tends to look at preventing a creeping crisis during the *creeping* phase. Only the last five mentioned studies - by Räisänen (2024), Boersma et al. (2020), Comes et al. (2022), Boin & de Graaf (2022) and Wolbers et al. (2024) - look at concrete approaches. However these approaches have not been tested to see whether and how they would work in practice. This study will try to put an approach to practice. This research will contribute to scientific literature by trying to make the concept of the creeping crisis more concrete by finding whether and how an approach can help to detect the tipping point of a creeping crises.

1.3. Research Question

When combining the found knowledge gap from the previous section and the formulated problem from the first section the following research question is drawn up.

What detection approach could help the Dutch safety regions in detecting the tipping point of a creeping crisis when the creeping phase becomes the hot phase?

The focus of this research question is on one tipping point: the moment when the creeping phase ends and turns into the hot phase. Besides this focus, there is also an emphasis on the fact that the detection approach should be helping the Dutch safety regions specifically. The focus lies on these organizations as the creeping crisis creates problems that are specific to them. The safety regions start responding when the hot phase starts, which is an issue in the case of a creeping crisis, as the start of the hot phase might not be as obvious as with 'flash' crises. Through the focus on the perspective of the safety regions, the focus on the policy perspective that was mainly found in the literature is not taken into account.
This research question can be split up in four sub-questions.

1. What is the definition of a creeping crisis for the Dutch safety regions?
2. How do the complexities of a creeping crisis affect the detection of the tipping point when the creeping phase turns into the hot phase?
3. What approaches can be used by the Dutch safety regions to detect this tipping point of a creeping crisis?
4. How can this tipping point of a creeping crisis be detected?

The first sub-question looks at the definition found in the previous section and asks whether this definition is suitable for the safety regions. The definition is quite policy-oriented and might not be useful for an organizational and executive actor like a safety region. Where the first question defined the creeping crisis as a whole, the second sub-question combines the complexities of a creeping crisis as found when defining this crisis with the detection of the tipping point. It tries to find what it is about this type of crisis that makes it challenging to detect the end of the creeping phase. The third question takes these complexities into account when looking for approaches to use by the Dutch safety regions to detect the tipping point. It is crucial that the approach can be used for the specific challenges that come with a creeping crisis. The last sub-question applies the found approaches to see how it can be put to practice, to test whether it might work in reality.

1.4. Reading Guide

In the previous section, four sub-question are given. In this thesis an answer to these four questions will be looked for. First, in the next chapter, chapter 2, the methodology to come to an answer is explained and worked out. Chapter 3 gives the results when looking for an answer to the first two sub-questions. These answers are used to work out a case to study in chapter 4. This case will be used in chapter 5. In this chapter a approach will be worked out and applied to the case from chapter 4. These results will answer the third and fourth sub-question. The answers from chapter 3, 4 and 5 will be discussed in chapter 6. This chapter will also include recommendations for policy and further research. Based on the findings and on this discussion an answer can be given to the research question in chapter 7.

2

Methodology

Before finding an answer to the research question and the four formulated sub-questions from the previous chapter, chapter 1, it is important to work out how these answers will be found. This chapter looks for a methodology for this thesis. First, a general research approach is explained. A visual representation of this approach can be found in figure 2.1. Then, the research design will be worked out in more detail.

2.1. Research Approach

To answer the research question and its sub-questions it is important to design the research in such a way to be able to draw reliable conclusions. The first sub-question takes the definition by Boin et al. (2020) found in the literature study and tries to find whether it is necessary to alter it to suit the perspective of the safety regions. This is done by conducting informal interviews with academic experts, experts in similar fields and tactical experts within the safety regions. The found definition will serve as input for the other sub-questions. The second sub-question will be answered by a short analysis of the definition. The third sub-question will be answered by informal interviews with experts from different safety regions. The findings of these interviews will be tested by the last sub-question by conducting a case study.

As there are many different types of creeping crises, it is impossible to research multiple crises in the given time frame. Here, a choice is made for which case to study. There are two larger-scale creeping crises the safety regions have dealt with that have already passed the creeping phase: the COVID-19 pandemic and the refugee crisis of the summer of 2022. When it comes to the crisis of the COVID-19 pandemic, a lot of research has already been conducted. Besides, the nature of this crisis has changed during the hot phase: it started as a health care threat, developed into an educational issue and transitioned into an economic and social problem. This changing nature makes this crisis less suitable to study through its incredible complexity. Lastly, the refugee crisis is more recent than the COVID-19 pandemic. This refugee crisis seems to be a creeping crisis as it built up over the span of a few months and did not have a clear start for the safety regions. There was no sudden onset. When conducting interviews to identify tipping points, a more recent issue will produce more reliable answers. Given these reasons, a choice is made to use the refugee crisis of 2022 as a case study as this crisis is smaller and has not been researched as much.

This research approach is a broad approach. The approach combines a conceptualization, an operationalization and an empirical grounding in one study. Because of this, it will be impossible to study any of these aspects very much in depth. However, this broadness of the research is necessary as this topic has not be researched much from this perspective, as can be found in chapter 1. The lack of research of creeping crises from a tactical perspective asks for an exploratory study. This exploratory study translates to a broad approach. The next section will give a more detailed design for each step of the research and will tie this to the aspects of conceptualization, operationalization and empirical grounding.

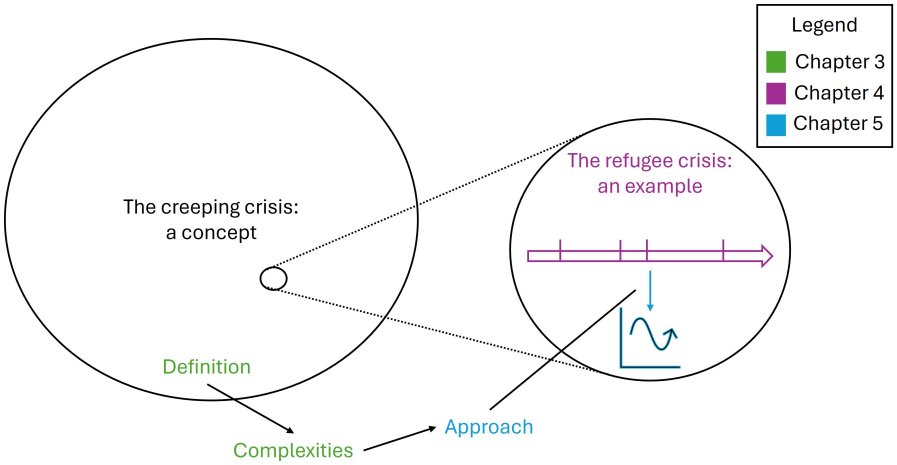

Figure 2.1: A visual summary of the research approach, the different colors indicate which chapter of this thesis focuses on which aspect.

2.2. Research Design

This section will explain how the four sub-questions are answered one by one. A schematic overview of the used methods can be found in figure 2.2.

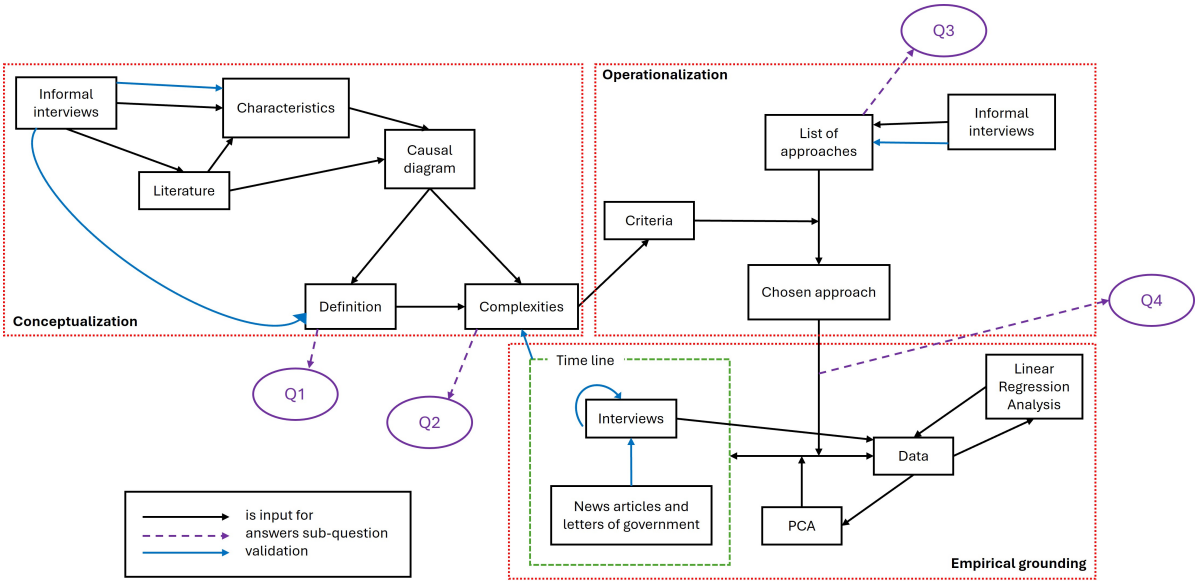

Figure 2.2: A schematic overview of the used methods, their in- and outputs, the way they answer the sub-questions and how they are validated.

2.2.1. Conceptualization

The first two sub-questions, which are looking for a definition and complexities, is the conceptualization of the research topic. It will be answered through two ways: informal interviews and a literature study. These informal interviews are conversations with different experts in which they are asked about their view on the concept of a creeping crisis. The respondents are from different fields.

- An academic expert
- Different experts at a crisis detection conference
- The Dutch police: the concept of a creeping crisis has also found its way into their domain
- Employees of different safety regions

- Employees within the department of crisis management
- Employees working for a VIK
- A Regional Operational Leader (ROL) (more on this role can be found in appendix A)

These listed respondents are asked about their view on the concept of a creeping crisis. Through this question, they are asked to give words to a gut feeling. These respondents are people who encounter creeping crises as part of their job. They intuitively know which crises are creeping crises and which are not. Through the question as to what the respondents think are characteristics of a creeping crisis, they can provide these characteristics or give advice on literature that can be studied. Besides, some of the mentioned characteristics can also be used as input for a further literature study, making the formulated definition more reliable with the use of multiple sources and methods. This reliability does not only come from the use of multiple sources and methods, it also comes from the diversity of the respondents. Their view on what defines a creeping crisis is valuable. The insights from people from different fields (even within the organization of a safety region) will help give a nuanced definition of this type of crisis.
These conversations will not provide a ready-to-use definition but the respondents and the studied literature will give characteristics of the concept. The studied literature is recommended by the respondents, mainly recommended by the academic expert. All recommended literature was taken into account. Besides this list of recommended literature, the literature found in chapter 1 has been taken into account as well.
A final list of characteristics will be shared with a part of the respondents for validation. The characteristics on this final list are the characteristics that were mentioned by respondents or in literature which were not contradicted by other sources. These characteristics can be translated to a definition through the use of a causal diagram. This diagram includes all found characteristics from the validated list of characteristics. These characteristics interact and influence each other. This causal diagram is created based on relations between characteristics found in literature, found through the informal interviews and through reasoning. This diagram helps to understand the role of the different characteristics and how they can be grouped together.

Definition

The created causal diagram is the input to find a definition. This definition makes use of the way the characteristics can be grouped together and how the different characteristics are either each other's cause or effect. In order to validate the found definition, it is shared with some of the respondents of the informal interviews to check with them whether they agree with the choices that were made.

Complexities

The answer to the second sub-question will be based on the found definition and the causal diagram and its characteristics. This definition and the causal diagram point out the important aspects that need to be taken into account when looking for an approach to use for the detection of a tipping point. The definition shows how a creeping crisis differs from a regular, 'flash' crisis. The fact that certain differences between the types of crises are important to mention means that they matter when it comes to dealing with them. These differences point at complexities of a creeping crisis and these complexities matter when looking for a detection approach. These differences translate to a need to treat the crises in a different way. This need for a different way is used in sub-questions 3 and 4.
The complexities are also found with the created causal diagram that includes the found characteristics. These characteristics interact and influence each other. This interaction creates complexities - makes it more difficult to detect tipping points. This causal diagram helps to understand these interactions. Through this understanding these complexities can be pointed out. The found complexities of a creeping crisis can be tested when looking at the specific case of the refugee crisis. This is a way to validate the findings and see how these complexities manifest themselves in practice.

2.2.2. Operationalization

The third sub-question makes use of these complexities to find a suitable approach for the detection of a tipping point, this is the translation of the conceptualization to operationalization. The concept of a creeping crisis needs to be operationalized in order to be able to detect tipping points. The approach found with this sub-question shows which way to operationalize the concept. First, a list of potential

approaches is made. The creation of this list is guided by informal interviews with partly the same respondents as were asked about the characteristics of a creeping crisis. The respondents to help create a list of approaches are employees of different safety regions who are working for a VIK. The mentioned conference that was visited focused on crisis detection and serves as an input for this list as well. These respondents were asked for ways in which they think a creeping crisis could be monitored or a tipping point could be detected. This would result in explanations of approaches they are currently using, or wish to be using for similar issues. In the informal interviews it is also discussed how these approaches would be able to deal with the complexities found with sub-question 2. The list of approaches is validated by sharing it with some of the respondents that gave input for the list.
Given the time frame of this thesis it is impossible to test all approaches from the created list. Therefore, a choice needs to be made which approach has the most potential to help with the detection of a tipping point. To make this choice, the approaches from the list are evaluated on how they deal with the complexities of a creeping crisis as found with sub-question 2. For this, criteria a created based on these complexities. These criteria can be found in chapter 5.

2.2.3. Empirical Grounding

The fourth sub-question tests whether and how the chosen approach can help with the detection of the tipping point. The answer to this question gives empirical grounding. The chosen approach is tested on an actual creeping crisis. This test is conducted using the case study as a basis. As mentioned in the previous chapter, chapter 1, very little research is done about approaches for the detection of tipping points. The only research available about these approaches look at these approaches in theory but do not test how they would work in practice. As a starting point, the found approach is tested for one case. How this case study will work is explained below. Within the answering of this sub-question two different methods are used: a case study that makes use of interviews and an exploratory data analysis. These two methods complement each other. The underlying theory is that the outcomes of the data analysis should match with the outcomes of the interviews: the outcomes of the used approach should be the same as the outcomes in real life for the approach to work. This is a matter of validating the chosen approach.

Case Study

When answering the four sub-questions, some of these answers rely on the mentioned case study. In the previous section it is already explained why the refugee crisis of the summer of 2022 is chosen as a case. In order to use this case, respondents are interviewed to understand how this crisis came to be. These respondents are chosen based on a document by Ten Dam (2018). This document shows the relevant actors related to the accommodation of refugees. Not all actors mentioned in the document were available for an interview. Respondents from the following organizations were interviewed:

- COA
- A municipality not in the province of Groningen
- The safety region Groningen
- Another safety region

The reasoning behind the chosen organizations can be found in chapter 4. The conducted interviews are semi-structured interviews. The respondents are all asked the same four questions.

1. *What was your role during the refugee crisis?* With the answers to these questions the answers to the other questions could be put in perspective.
2. *How did the refugee crisis develop from your perspective?* The answers to this question helps to understand the answers to the last two questions as a respondent's perspective of the development of the crisis will help understand why specific tipping points are pointed out.
3. *When did the hot phase of the crisis start from your perspective?* This could be one or multiple moments.
4. *What was happening at that moment to make you say that the hot phase started?* This question looks at the reasoning behind this tipping point to understand what information was needed for the respondents to decide that the creeping phase was over. The answer to this question provides indicators to be used as input data when testing out the approach.

At the end of these four questions they are all asked if they wanted to add something they were not asked about. This, to make sure no relevant information was missed. The answers given by the respondents are verified with the information received from the other interviews and from sources such as news articles and official letters of government. The timeline provided by the respondents, news articles and letters of government shows the development of a creeping crisis in reality. This timeline is used to validate the found complexities from sub-question 2.

Translating the Case Study to the Approach

To answer the fourth sub-question, the found approach from the third sub-question and the case study are connected. The respondents from the conducted interviews have, when asked the fourth question during the interview, identified factors that, they think, led to a tipping point. This fourth sub-question tests whether, given the factors, the approach could come to and detect the same tipping points as were given by the respondents.

Input Data

All these factors can be used as input data for the found approach. For some factors a further operationalization was needed. This was done by brainstorming how these factors could be made measurable. A list of these factors can be found in chapter 4. The input data used is public data for each month in 2021 and in 2022. The exact data used can be found in chapter 5. The data used is all the factors that are publicly available. Some of the data is not available for the full time span: two factors are only available for 2021 and not for 2022. Given the fact that there is not much data available to start with, it is important to make use of the available data as much as possible. Therefore, this gap is bridged with a linear regression analysis. This analysis is used to create two models to fill in the gaps in the data for two factors. The available data is used to predict the 'unavailable' data. The found linear regression models fill in the gap for 2022. The used models are selected on their adjusted R-squared values. These and other considerations can be found in chapter 5.

Principal Component Analysis

The available data is used to test the found approach for the empirical grounding of this approach. To do so, a Principal Component Analysis (PCA) is conducted. This PCA reduces the amount of variables while maintaining as much variance of the original data as possible. This PCA is conducted twice: once on the available normalized data and once on the percentage change of this data. In both cases, the process of the PCA is the same. The amount of components are decided by the eigenvalues of the components and by the explained variance ratio the component adds. All components with eigenvalues above 1 are included and used to test the approach. Besides this, components with eigenvalues below 1 but that add a relatively high amount of variance are also included and used.

2.2.4. Conclusion

To conclude, the conceptualization of the creeping crisis helps with understanding what complexities to take into account for operationalization. This operationalization can be tested on a case through empirical grounding. The conceptualization makes use of a causal diagram. The empirical grounding makes use of a linear regression analysis and a principal component analysis. This empirical grounding cannot be found within the literature found in chapter 1. Most of the literature found in this chapter makes use of conceptualization with some literature focusing on operationalization. Even though the conceptualization can be found in the literature and therefore the conceptualization in this research might add very little to the existing literature, it is an important aspect of this research as it serves as input for the operationalization and empirical grounding. Without a conceptualization no complexities can be pointed out based on which no approach can be chosen. Without an approach, it cannot be tested and there would be no empirical grounding.

3

Defining a Creeping Crisis

Before looking into the operationalization and empirical grounding it is important to conceptualize a creeping crisis. What do people mean by it and what is it about this type of crisis that makes the research relevant, important and complex. The explanation from the safety region perspective given in section 1.1 could be seen as gut feeling: a description without a definition. This description can be based on people's intuition. However, most people will have slightly different intuitions and therefore distinguish situations differently. A definition might help bridge this gap. A definition creates a common understanding and makes discussion about whether or not certain situations can be seen as creeping crises easier.

In a previous chapter, chapter 1, the idea of a creeping crisis has already been explained. A definition by Boin et al. (2020) is found in this chapter as well. However, it is also concluded that the perspective of this definition might not be suitable for the perspective of the safety regions. A suitable definition is needed to demarcate this research.
As mentioned before, Boin et al. (2020, p.122) see a creeping crisis as "a threat to widely shared societal values or life-sustaining systems that evolves over time and space, is foreshadowed by precursor events, subject to varying degrees of political and/or societal attention, and impartially or insufficiently addressed by authorities." This definition should not be disregarded easily, especially since this definition is used and worked with in multiple articles, as seen chapter 1. However, it can be questioned whether this definition is useful in the context of the safety regions, who are not political. Even though this definition is not necessarily untrue, the focus of this definition is on the governance of creeping crises and on the action that might be taken to prevent them. Especially terms such as 'political attention' or 'insufficiently addressed by authorities' show the governance-focus of this definition. It can be argued that this is not relevant from a tactical perspective. While the societal and political attention will be crucial to the outcome of the crisis they do not truly matter to the tactical perspective of the safety regions. Whether there is a lack of attention for an issue does not make the safety regions more or less inclined to deal with it.

Altogether the definition by Boin et al. (2020) clearly is very useful for the governance perspective, as shown by the number of articles that use the definition - only on Google Scholar the article is cited more than 300 times. However, certain parts of the definition do not suit the tactical perspective of the safety regions as described in chapter 1. It is important to have a description of the concept that suits this perspective as this definition will show the complexities that safety regions will have to deal with.

While there is a definition of a creeping crisis from a governance perspective, there is no ready-to-use description from a tactical perspective. Why this is the case is not entirely clear. It does seem to be the case that there is much more crisis research done from a governance perspective. The safety region perspective is a very Dutch perspective as safety regions can only be found in the Netherlands. Dutch crisis research frequently focuses on the governance perspective. It might be that the dominant researchers in the field have focused on the governance perspective for decades already and that the safety regions with their different perspective are young organizations that have not yet had the time

to put their mark on research. Besides not having had the time, the safety regions originally are quite practical organizations as it stems from the fire departments. Besides, as mentioned in a previous chapter the concept of a creeping crisis is quite new to actors like the safety regions, since their focus has been on flash crises. This makes that for the safety regions the creeping crisis is relatively new and that research from this perspective is limited. To add to this, the governance perspective looks at ways to prevent creeping crises from developing further, while the tactical perspective does not, as safety regions only actively come into play once the creeping phase is over. They might, passively, be monitoring the situation during the creeping phase,

Given the reasons against the use of the definition mentioned above, it is best to start from scratch to formulate a description of a creeping crisis from a tactical perspective. For this, different literature is used – including the definition from Boin et al. (2020). Besides the literature, definitions used in practice and input from practitioners are also used as input for the new definition.

3.1. Crisis

A creeping crisis is a specific type of crisis. Therefore, it is necessary to start with the definition of a crisis, instead of immediately jumping to the definition of this specific type. Rosenthal et al. (1989) define a crisis as “a serious threat to the basic structures or fundamental values and norms of a social system, which necessitates making critical decisions under time pressure and highly uncertain circumstances”. This definition seems to be quite clear and straightforward. However, McConnell (2020) points out the difficulty of defining a crisis. The term ‘crisis’ is not neutral, it is political. He sees this term as an umbrella term that includes terms such as ‘emergencies’, ’disasters’ and ’catastrophes’. The word ‘crisis’ can be used broadly: a personal crisis, a political crisis, an environmental crisis. The way the term, or which sub-term, is used can frame the problem. A catastrophe is seen as worse than an accident, a blunder is seen as someone’s fault while a disaster is often seen as something natural. Because of these different ways of calling something a crisis, McConnell stresses the use of the term ‘crisis’ is a political decision. The government can use the term to unite the country, to get something done or to attack opponents. However, other parties can also use the term to call for action or to promote an agenda.

Even though McConnell (2020) argues the term ‘crisis’ is political, the emergency services acting on these crises are not. The safety regions are not political, and yet, are able to call specific situations a crisis. The Safety Regions Act has defined the term ‘crisis’ quite broadly. ”A situation where a vital interest of society is attacked or threatens to be attacked” (Safety Regions Act, own translation). Here a crisis is all about the vital interests of society, which is very broad. When these interests are under attack or there is a threat, this can be called a crisis. This definition closely relates to the definition by Rosenthal et al. (1989) where the first talks about ‘vital interests of society’ and the second talks about ‘basic structures or fundamental values and norms of a social system’. However, it can be argued that ‘fundamental values and norms’ are still quite political, while ‘basic structures of a social system’ are more closely related to the less political ‘vital interests of society’.

3.2. Different Types of Crises

Turner (1978) first makes a distinction between natural disasters and what he calls ‘man-made disasters’. He looks at how these man-made disaster come to be. The description of how this disaster is created starts with a belief of how the world works and laws, standards and regulations to prevent accidents from happening. The moment a situation starts to deviate from these norms unnoticed the incubation period starts. This incubation period is the “accumulation over a period of time of a number of events which are at odds with the picture of the world and its hazards represented by existing norms and beliefs. Within this ‘incubation period’ a chain of discrepant events, or several chains of discrepant events, develop and accumulate unnoticed. [..], during the incubation period one of the set of vague and unperceived hazard problems which are ‘waiting in the wings’ begins to be covertly delineated.” (Turner, 1978, p. 86). This period starts with the first discrepancy and ends with a precipitating event. “The precipitating event forces itself to the attention because of its immediate characteristics and consequences – a burning building, or an explosion cannot be ignored – and it makes it inevitable that the general perception of all of the discrepant events in the incubation period will be changed.” (Turner, 1978, p.89). With the precipitating event, everything that went unnoticed during the incubation period becomes clear.

This idea of an incubation period where a risk builds up and ends in a precipitating event, has a lot of similarities to the idea of a creeping crisis. The incubation period can be seen as the creeping phase and the precipitating event as the tipping point between the creeping phase and the hot phase. However, the risks that Turner looks at are not the types of risks that are typically associated with a creeping crisis. From the point of view of the safety regions, the disasters that Turner (1978) looks at are still flash crises: the incubation period ends with a clear crisis, the precipitating event. An explosion or a fire caused by accumulating risks are still acute crises that clearly show when the safety regions come into play. It could said that a creeping crisis is an incubation period that does not end in a clear precipitating event. However, during the incubation period itself this might be unclear. During the creeping phase it might be unknown how the creeping phase will end. It could be imaginable that the incubation period of a climate crisis, for example, will end with a clear precipitating event. However, it could also be the case that the tipping point will not be clear.

This unclear, unknown end of creeping phase can be tied to the idea of unknown unknowns as introduced by Rumsfeld, former American minister of Defense (Rumsfeld, 2011). Creeping crises are often in the realm of the unknown unknowns or the known unknowns. The uncertainty around the end of the creeping phase shows how much about the threat is unclear and unknown. Some creeping crises the safety regions might see coming in some way. The climate crisis can be seen as a known unknown: it is a highly uncertain situation, no one knows how this crisis will develop, however, we are aware of these unknowns. Other creeping crises might suddenly hit without the safety regions being aware of it beforehand. To use the terminology of Turner: the incubation period developed unnoticed. These crises are in the realm of the unknown unknowns.

The idea of the unknown unknowns can be tied to what Boin, in a presentation (A. Boin, personal communications, November 27, 2024), sees as the knowable and unknowable crises. The knowable crises he sees as a puzzle, while the unknowable crises are a mystery. These knowable crises might be connected to the known unknown crises, the unknowable crises to the unknown unknown crises. A puzzle can be detected by paying attention to the ‘precursor events’. The mystery can be detected by looking at anomalies. These precursor events can also be found as one of the four dynamics as mentioned by Boin, Ekengren et al. (2021). They see four dynamics when it comes to creeping crises:

- “the emergence and gradual development of threat potential, owing to interacting conditions over time and space;
- the foreshadowing of the threat through precursor events;
- the shifting nature of threat attention, amongst societal groups and public officials;
- the partial or insufficient response to the threat.”

The first dynamic can be linked to Turner’s ‘incubation period’. The third and fourth dynamic are governance- and policy-oriented and might not matter from a tactical perspective. It seems that the safety regions are not among the public officials meant here as the safety regions are not the authorities to act during the creeping phase of a creeping crisis. Besides, these dynamics seem to be signs of a creeping crisis instead of a definition. Attention and response are two dynamics that are heavily intertwined: societal attention demands response and response increases attention. However, these dynamics are not inherent to a creeping crisis – especially given the unknown unknown aspect of this crisis. Boin, Ekengren et al. (2021) state that a creeping crisis is defined by a varying degree of attention and an insufficient response. However, a crisis caused by an unknown threat might not receive any attention at all. This threat could build up undetected and unnoticed (and if it is noticed, it is misunderstood): an unnoticed incubation period. However, in hindsight the threat becomes visible, as also found in Turner’s explanation on the ‘precipitating event’.

This reasoning does not mean attention and response do not matter. On the contrary, they are very important to the development of the crisis. They can make it or break it. And with this, they increase the complexity of the crisis. Attention can demand a political response and add time pressure. The response of policy-makers can decide whether the crisis dies down or not. This way the attention and response can decide whether the crisis keeps developing or whether it is solved before it reaches the tipping point.

The mentioning of precursor events by Boin, Ekengren et al. (2021) seems to be contradictory with

the difference between detecting a puzzle and a mystery. One could argue that the creeping crisis in the realm of the unknown unknowns, the mystery, is not foreshadowed by precursor events. At least, these precursor events are not interpreted as such due to the unknowable nature of the crisis. However, when it comes to the crisis in the realm of the known unknowns, the puzzle, the precursor events do come into play.

3.3. Creeping Crisis in Relation to Other Types of Crises

In an earlier chapter, chapter 1, the long-term crisis has been mentioned besides the creeping crisis. Since they are both non-flash crises they share similarities. To differentiate between the different types of crises the safety region Zuid-Limburg defined four types of situations: the acute crisis, the acute threat, the long-term crisis, the creeping crisis (Veiligheidsregio Zuid-Limburg, 2024). These situations are defined by the acuteness of the situation and by whether the situation is (still) a threat or already an event. An acute crisis is an acute event, a long-term crisis is a non-acute event and a creeping crisis is a non-acute threat. This shows the creeping crisis can be seen as a non-acute threat. A similar conclusion is drawn by the Netherlands institute for public safety (NIPV), though the institute defines the term ‘long-term crisis’ slightly different than safety region Zuid-Limburg does. For the NIPV a long-term crisis is an umbrella term for a type of crisis that includes the creeping crisis (personal communications, M. van Duin, October 22, 2024). A long-term crisis is a crisis that:

- spans a longer period of time
- does not always ask for an acute response
- is less often accompanied by time pressure
- is often complex

The first part of this definition is similar to Turner’s ‘incubation period’, though the longer period of time does not only include the creeping phase but also the hot phase. So, a war that starts abruptly might not have a creeping phase at all but might span a longer period of time. Therefore the longer time span on its own is no sign of a creeping crisis. The lack of an acute response is similar to the definition of safety region Zuid-Limburg. The lack of time pressure shows how a long-term crisis, and with that a creeping crisis, is different from a crisis as defined by Rosenthal et al. (1989).

The definition of the NIPV includes the idea that the long-term crisis is complex. The term ’complex’ is a very broad term. No explanation about this term accompanies the definition. However, when talking about complex crises and incidents, this often refers to incidents that are difficult to tackle. A complex fire could be a fire in a high apartment building that is difficult to reach by the emergency services. In practice the complexity of an incident is visible in the amount of dispatched personnel and the amount of equipment necessary (Veiligheidsregio Hollands Midden, n.d.). Here, a choice is made to define complexity as the amount of factors that play a role and interact with each other. The more factors influence the crisis or incident the higher the complexity. The complexity also increases when the factors interact with each other causing feedback loops or cascading effects.

’t Hart & Boin (2001) also see a type of crisis that is closely related to the creeping crisis. Besides a creeping crisis, they also see a long-shadow crisis as a long-term crisis. Both types seem to be a type of long-term crisis. This long-shadow crisis can be seen as the opposite of the creeping crisis as defined here. As the creeping crisis that is defined in this chapter has the creeping phase after the cold and before the hot phase, the long-shadow crisis is about the end of the crisis. At the end of the hot phase the situation does not go back to normal immediately but a creeping phase follows the hot phase.

Pot et al.(2022) also see a possibility of the combination of a creeping crisis and an acute or ’flash’ crisis: the dual crisis. This occurrence is similar to the precursor events as pointed out by Boin, Ekengren et al. (2021). An example of a dual crisis can be found when looking at natural disasters increased by climate change. These disasters are acute crises but they are also precursor events for a creeping crisis.

The different perspectives mentioned in this chapter show there are different definitions. None of these definitions fully contradict each other, there is quite some overlap. However, they do differ at a few

points. Given the unknown unknown aspect of these crises, the definitions will most likely change when a new creeping crisis appears. This is why it might be concluded that creeping crises are wicked problems as defined by Rittel & Webber (1973). While Rittel & Webber (1973) see ten characteristics that make up a wicked problem, the focus of this research is on the fact that wicked problems cannot be defined and that it is difficult to find a solution for a wicked problem. Often this aspect refers to political decision-making: because of the political complexities it is difficult to define a problem and find a solution. However, when defining a creeping crisis the focus lies on the difficulty to define a creeping crisis and to find a solution and not on the political complexities. However, since the creeping crisis is such a political problem, in reality these political complexities do play a role. But, in this chapter the focus lies on the fact that it is impossible to clearly define what the creeping crisis is. The political complexities are not necessarily taken into account in this chapter. Through the 'wickedness' of the creeping crisis, the question 'what is the problem we are dealing with?' cannot be answered. Besides, the solution for this crisis is also difficult to find. The fact that the creeping crisis is a wicked problem also means that the definition formulated in this chapter will most likely be changed with the appearance of the next new creeping crisis, as formulating a clear and final definition is impossible.

3.4. Definition

Combining the different aspects from the literature mentioned above gives a list of factors that define a creeping crisis. This list combines the 'vital interests of society' from the Safety Regions Act, the terms incubation period and precipitating event from Turner, the definitions from the NIPV and from the safety region Zuid-Limburg and one of the dynamics from Boin, Ekengren et al. (2021). This does not mean the other three dynamics are considered incorrect. However, they are not seen as relevant from a tactical perspective or are contradicted by other characteristics. The following list of characteristics is made.

A creeping crisis is a threat to one or more vital interests of society for which:

There is a long incubation period There is a longer period of the threat building up. The term incubation period comes from Turner (1978) and is used similarly by the NIPV (personal communications, M. van Duin, October 22, 2024).

It is unclear whether the threat asks for an acute response What the response to the threat should be is unclear. It is also unclear whether this response should be acute (personal communications, M. van Duin, October 22, 2024; Veiligheidsregio Zuid-Limburg, 2024).

There is no clear time pressure Through the long incubation period there is uncertainty about the time pressure to act (personal communications, M. van Duin, October 22, 2024).

The threat is complex The factors that create the threat interact with each other making the interaction difficult to understand (personal communications, M. van Duin, October 22, 2024).

The threat can be found in the realm of the known unknowns or the unknown unknowns The threat is something that has not been seen before and might not even be imaginable (Rumsfeld, 2011).

The incubation period might not lead to a precipitating event as the threat dies down The creeping phase might not lead to a hot phase. This idea of a precipitating event comes from Turner (1978).

When the threat does not die down, the precipitating event might not be clear or might not happen at all When the creeping phase leads to the hot phase it is unknown in advance whether there is a clear sign of this happening. This idea of a precipitating event comes from Turner (1978).

A creeping crisis is a wicked problem It is unclear what the threat exactly is and what the solution to this threat is (Rittel & Webber, 1978)

Among other things, this list shows the uncertainty around the precipitating event as the incubation period can end in three different ways:

- It can end as the creeping phase dies down and nothing happens: there is only a tipping point from the creeping phase to the cold phase.
- It can end in a precipitating event as the situation 'explodes': there is an obvious tipping point from the creeping phase and the hot phase.
- It can end without a clear precipitating event and turn the situation into a hot phase: there is no obvious tipping point from the creeping phase and the hot phase.

During the incubation period it is unknown which of these three ways will happen or when they will happen. For the first way it would not be necessary to act as nothing will really happen, there is no tipping point to the hot phase. For the second way it would not be necessary to pay attention during the incubation period as during the precipitating event the crisis will clearly present itself, there is a clear tipping point. However, for the third way it would be very important to pay attention during the incubation period as it won't be clear when and how this period will end and the hot phase will start. Without paying attention there is a risk of ending up in the middle of the hot phase without being aware of it. Only the third way comes with difficulties for detecting the tipping point of the crisis and deciding when to act. However, during the incubation period it is unknown which of the three ways will happen. To add to this, the fact that the length of the incubation period is unknown as well.

3.4.1. Causal Diagram

The factors from this list do not stand on their own. Some of these factors influence each other or are the (partial) result of one or more other factors. These relationships between the factors are shown with a diagram in figure 3.1. In this diagram in figure 3.1 two different lines are shown between the factors. The solid arrows show the causal relationships found in literature. The dashed arrows show the causal relationship that are found by reasoning.

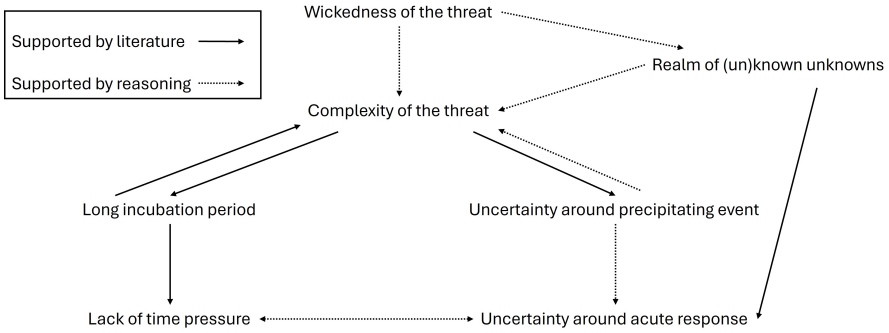

Figure 3.1: A causal diagram of the factors that define a creeping crisis

The complexity of the threat causes a long incubation period, as different aspects of the threat interact and build up (Boin, Ekengren et al., 2021), and through this long incubation period the threat is able to build and move through systems (Boin et al., 2020; Head, 2022), adding to the complexity. The complexity and the uncertainty around the precipitating event have a similar relationship as the complexity adds to the uncertainty (Boin et al., 2020). This uncertainty also adds to the complexity as this uncertainty is another factor that influences the threat.
The long incubation period leads to a lack of time pressure (Boin, Ekengren et al., 2021; Tolsma, 2021; Head, 2022), as this long period does not require quick action. The uncertainty around the precipitating event leads to uncertainty around an acute response. The response of a safety region comes naturally with a precipitating event, a clear tipping point: a fire or explosion prompts the safety region to an acute response. However, since this precipitating event might not happen, the necessity of such a response is uncertain. The lack of time pressure and the uncertainty around an acute response seem to be quite similar. The uncertainty adds to the lack of time pressure, as a paralyzing effect, and the lack of time pressure adds to the uncertainty around the response, as the lack of pressure might make it feel like no acute response is needed.
This uncertainty around the response is also caused by the fact that creeping crises can be found in the realm of the known unknowns or the unknown unknowns. Unfamiliarity with the crisis leads to uncertainty in how to act (Boin, McConnell et al., 2021). This realm of the (un)known unknowns also

leads to the threat being complex, as it is unknown how the factors that have created the threat interact and increase the threat. This lack of knowledge leads to more complexity: the interacting factors are unclear or unknown. This complexity is also created by the fact that creeping crises are wicked problems. This causal relationship lies in the fact that wicked problems cannot be defined and that finding a solution is difficult - the best solution even impossible. Through the fact that the exact problem is unknown it is also unknown what factors play a role. This increases the complexity. Another aspect of a wicked problem adds to the presence of creeping crises in the realm of the (un)known unknowns. Each wicked problem is unique. Therefore, each creeping crisis is a new type of crisis that has not been seen before. This adds to the 'unknowability' of the crisis.

From the diagram in figure 3.1 it could be concluded that all factors that define a creeping crisis revolve around the complexity of the threat: all factors either lead to this or are caused by this. However, complexity on its own does not make a creeping crisis. 'Flash' crises can also be called complex. A fire in a high apartment building is a very complex threat. The same goes for a fire in a hospital. These types of crises can be big, complex and impactful. However, they are not creeping crises. This shows the complexity of the threat on its own does not define a creeping crisis. Still, the list of factors that define a creeping crisis includes factors that overlap and affect each other. Reducing this would create a more straightforward and clear definition. The diagram in figure 3.1 does help to see the relationships between groups of factors. The main relationships between the characteristics seem to revolve around the complexity, the incubation period and the precipitating event. These relationships are the core of the causal diagram in figure 3.1. The other factors either influence the complexity of the threat or are influenced by the long incubation period or the precipitating event. A small exception can be found in the relationship between the 'unknowability' and the acute response. However, with these core relationships and the factors around this core, three groups can be formed. Each group relates to another aspect of a creeping crisis. These groups are shown in figure 3.2.

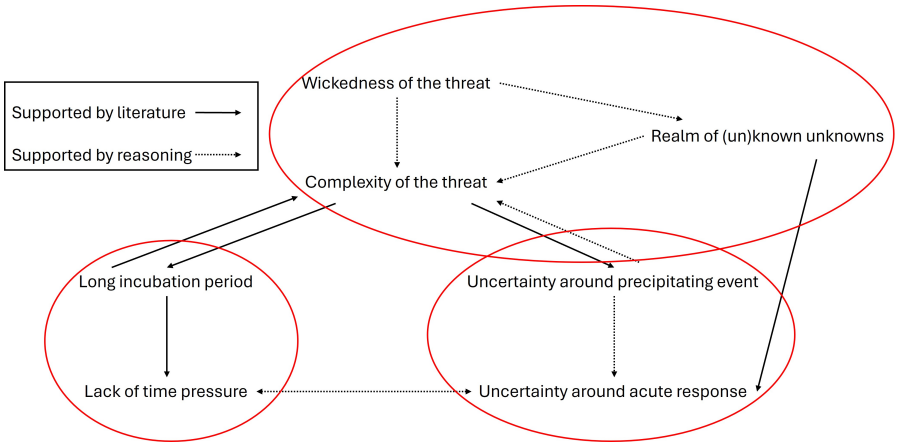

Figure 3.2: A causal diagram of the factors that define a creeping crisis with factors grouped together.

Figure 3.2 shows the same causal diagram as the diagram in figure 3.1. However, in the second diagram three red circles are added to show how the factors can be grouped together. The first group is made up out of three factors: *the wickedness of the problem*, *the realm of the (un)known unknowns* and *the complexity of the threat*. These factors are all about the nature of the threat. The threat is a wicked problem, the threat is unknown and the threat is complex. The second group puts a *long incubation period* and a *lack of time pressure* together. This group is not about the nature of the threat but specifically about the creeping phase. The last group is made up out of the *uncertainty around the precipitating event* and the *uncertainty around an acute response*. This group is focused on the tipping point when the creeping phase ends and the hot phase starts. This last group shows that it is not so much the tipping point itself that defines a creeping crisis but it is the **uncertainty** of the tipping point that is most important. This uncertainty around the tipping point is the aspect that differentiates a creeping crisis from Turner's (1978) man-made disasters. These man-made disasters might also be complex and unknown. They also have a long incubation phase during which a threat is able to build. However, the uncertainty around the tipping point is what sets a creeping crisis apart from Turner's (1978) man-made disaster. It is unknown how the tipping point will manifest itself: with a clear onset or

quietly or not at all. This uncertainty is an important aspect of a creeping crisis. The same goes for the second group: if it were known how long the creeping phase would last and how the threat would build up, this creeping phase would not be an issue. It is the **uncertainty** around it that makes a creeping crisis difficult to deal with. When it comes to the first group of factors, the nature of the threat can also be described with the term **uncertainty**. As mentioned before, the complexity of the threat in itself is not new and does not only apply to the creeping crisis. However, complex fires can be dealt with, as the type of threat is relatively well-known and therefore the ways to deal with the threat are known as well. The threat of a creeping crisis is not only complex, it is not seen before through the fact that it is unknown. Besides, solutions to the threat are difficult to find through the wickedness of the threat. Here, the term uncertainty applies like it does for the other two groups of factors. It is the uncertainty around the nature of the threat that causes the issues of dealing with a creeping crisis.

These groups all affect each other. The uncertainty of the nature of the threat affects the uncertainty of the creeping phase. It is uncertain what the threat is made up of and how aspects of the threat interact with each other. Because of this it is uncertain how the creeping phase will build up through the interacting aspects and how long this phase will last. The other way around, the uncertainty of the creeping phase also affects the uncertainty of the nature. Through the uncertainty of the creeping phase the aspects of the threat have time to interact with each other and make the threat itself more complex and uncertain. The uncertainty of the nature of the threat also affects the uncertainty of the tipping point. Because of the uncertainty around the nature of the threat it becomes uncertain whether and how the creeping phase turns into the hot phase. The different interacting aspects of the threat, that make the threat complex, cause the creeping phase to reach a tipping point eventually. However, whether this will be a tipping point towards the hot or cold phase is uncertain. Besides this, it is also uncertain what the nature of the threat will be and how it will show itself. This also creates uncertainty around the response to the threat: 'how do we need to act?' and 'how fast do we need to act?' The uncertainty around the tipping point in turn affects the uncertainty of the nature of the threat. The uncertainty of how the threat might eventually show itself makes the threat itself more complex and unpredictable. Finally, the uncertainty of the creeping phase and the uncertainty of the tipping point also affect each other. The lack of time pressure that comes with the uncertainty of the creeping phase creates more uncertainty about the response to the threat. This also works the other way around.

3.4.2. Definition

The found groups of factors can be combined in the following definition of a creeping crisis:

A creeping crisis is a threat to one or more vital interests of society for which there is uncertainty about the nature of the threat, about the buildup of the threat and about the end of this buildup.

The focus of this definition is on *uncertainty*. Uncertainty can be seen as "limited knowledge about future, past, or current events" (Walker et al., 2013). This limited knowledge can have different levels. Walker et al. (2013) see five levels of uncertainty between complete certainty and complete uncertainty. The first level has a clear idea of the future with some sensitivity. This level has very little uncertainty. For the second level the uncertainty can be described in statistical terms. The third level has some more uncertainty as there are a few different alternative futures. However, their likelihood can be ranked. The forth level also sees alternative futures. In this case there is a multitude of them and they cannot be ranked based on likelihood. Lastly, the fifth level is closest to complete uncertainty. Here, "what is known is only that we do not know" (Walker et al., 2013). Even the direction of the future is completely uncertain.
When it comes to a creeping crisis there is quite a lot of uncertainty as can be seen from the definition. However, there tends to be things that we *do* know. Taking the COVID-19 pandemic as an example, this was a case of a lot of uncertainty, however, there were certain relations between factors that *were* known. Though, it was impossible to rank the possible futures based on likelihood. It could be said that this pandemic had a level 4 uncertainty. Of course, this is just one example. As concluded before, creeping crises can be found in the realm of the (un)known unknowns. Therefore, there could, in the future, be a creeping crisis with an uncertainty of level 5. However, an uncertainty of level 3 or lower seems unlikely. As an uncertainty of a lower level does not pose great difficulties. These levels of uncertainty can largely be seen as problems based on a lack of information (Walker et al., 2013). However, an issue in the realm of the (un)known unknowns cannot be solved by gathering more information. This

means that the uncertainty around creeping crisis will have to be accepted: they are ”unknowable and unpredictable at the present time” (Walker et al., 2013).

The (grouped) factors, their relationships and their effect on the creeping crisis are summarized in table 3.1.

3.4.3. Comparing the Definitions

At the start of this chapter it was argued that the definition of a creeping crisis by Boin et al. (2020) is not suitable for the safety regions and their tactical perspective. Now that a new definition from this perspective is created it is important to reflect on the differences and the need of these two perspectives and descriptions. Even though there are two different perspectives, the two definitions describe the same situations in practice. If a situation can be called a creeping crisis by one definition, it will most likely also be called a creeping crisis by the other. This raises the question why there would be a need for the formulated definition in this chapter. The two definitions point out different complexities to a creeping crisis. The definition by Boin et al. (2020) points out complexities that are relevant from a strategic or governance perspective. The definition formulated in this chapter points out complexities that are relevant for the safety regions and their tactical perspective.

Both types of complexities are important from their own perspective. Therefore, it can be concluded that the formulated definition in this chapter only *adds* something to the definition by Boin et al. (2020), it does not replace it. However, the definition by Boin et al. (2020) is already used in literature. Therefore, it might be more accurate to call the ’definition’ formulated in this section a ’description from a tactical perspective’. In the next chapters the term ’description’ will be used when referring to the description formulated in this section.

3.5. Tipping Points

Even though the found description is not a specific description of tipping points, it does show how these tipping points come to be and why it is difficult to detect them. Note that in this section the tipping point mentioned is the tipping point at the end of the creeping phase. This tipping point can turn the creeping phase into the hot phase or back into a cold phase. Even when the creeping phase turns into the cold phase, this tipping point is still interesting to the safety regions as it is unknown beforehand what side the threat will tip towards. Of course, once the threat tips towards a cold phase it is no longer interesting from a tactical perspective.

Van Nes et al. (2016) see that the term ’tipping point’ can be used ”for the phenomenon that, beyond a certain threshold, runaway change propels a system to a new state” (Van Nes et al., 2016, p. 902). A tipping point can be seen as a point of no return. In this case, the tipping point introduces the hot phase. This phase will not pass on its own, action needs to be taken to return to a different phase. This is different from the creeping phase, which might go back to the cold phase without intervention from a safety region. The formulated description sees uncertainty about this tipping point. This uncertainty comes from the fact that it is unknown when this tipping point will take place and what this point will look like. First, it is unknown whether the creeping phase will turn into the hot or back into the cold phase. Second, it is unknown whether the tipping point will be obvious, a precipitating event.

Besides the uncertainty about the nature of the *tipping point*, there is uncertainty about the nature of the creeping crisis in general, which influences the uncertainty around the tipping point. The wickedness of the threat makes it difficult to know what to pay attention to when trying to understand when the tipping point can be expected and how this point will manifest itself. What the threat is - what the problem is - is uncertain and with that it is unknown what the tipping point will look like. Besides, through the complexity of the threat - the interacting factors - this is made even more difficult. These interacting factors are the reason for the building up of the threat *and* are the reason for the tipping point to be reached.
The uncertainty around the creeping phase provides room for the interacting factors to interact even more allowing for more complexity and, with that, more uncertainty about the nature of the threat. This uncertainty makes the tipping point even more uncertain.

Table 3.1: A summery of the factors that characterize a creeping crisis, their relationships and their effect.

Group	Factor	Effect on other factors	Effect on the creeping crisis
Uncertainty around the nature of the threat	Wickedness of the threat	Leads to more complexity of the threat through the difficulty to define the problem and find a solution and adds to the 'unknowability' of the crisis through the fact that every crisis is unique.	Makes the creeping crisis more complex as it introduces the difficulty to define what the threat is and how it could be solved.
	Realm of (un)known unknowns	Leads to more complexity of the threat through aspects of the threat being unknown and not understandable and leads to more uncertainty around an acute response as no comparable situations can be used to decide on a response.	Makes the creeping crisis more uncertain as every creeping crisis is a threat that has not been seen before and could not easily be foreseen.
	Complexity of the threat	Leads to a long incubation period as aspects of the crisis are able to interact and allow the threat to build up and leads to uncertainty around the precipitating event as through the interaction of aspects it is not clear how the buildup will end.	Makes the creeping crisis complex as different aspects of the threat interact with each other, enhancing the threat.
Uncertainty about the creeping phase	Long incubation period	Leads to a lack of time pressure as there seems to be a long time to prepare and adds to the complexity of the threat as the long period of time allows the aspects of the threat to interact even more.	Introduces the creeping phase which is a new situation for responding actors, adding a period of uncertainty and allowing the threat to build up.
	Lack of time pressure	Adds to the uncertainty around an acute response as time pressure can force a response and a lack of time pressure does not.	Creates uncertainty about when to act.
Uncertainty about the tipping point ending the creeping phase	Uncertainty around precipitating event	Leads to an uncertainty around an acute response as when it is not clear when and how the hot phase starts it is unclear how to respond to the threat or crisis.	Introduces an uncertainty that is specific for the safety regions as it takes away their cue to act.
	Uncertainty around acute response	Adds to a lack of time pressure as when the situation does not demand an acute response there will be no time pressure as normally exists in crisis situations.	Creates uncertainty for the safety regions as it takes away their regular response to crises.

4

Case: Refugee Crisis

The description found in the previous chapter gives a broad range of crises. Every crisis is a completely different situation compared to other creeping crises. This makes empirical grounding difficult. In this stage, with the current amount of research conducted on this topic, a general study to a monitoring approach will be impossible. Therefore, this asks for a case study. The safety regions have dealt with only a handful of creeping crises and two of these were prominent creeping crises on a national level: the COVID-19 pandemic and the refugee crisis of 2022. The refugee crisis being more recent and more straightforward - the crisis of the COVID-19 pandemic had a major societal impact and with that has changed form during its run from a health crisis to an educational crisis to a social crisis, the refugee crisis has not seen this many changes - this crisis is used as a case to study further. This refugee crisis had been building up for some months and did not have a sudden onset. Its connection to the description of a creeping crisis will be further worked out in this chapter. For this chapter, 7 respondents were interviewed. This chapter will first give an list and explanation of these respondents, then an overview will be given of how this crisis came to be and its link to the description of a creeping crisis will be explained, then the tipping points of this crisis will be highlighted and finally a list of factors and their relationships will be worked out.

4.1. Respondents

In order to be able to make a timeline that is as complete as possible with different perspectives multiple respondents from different organizations have been interviewed. These respondents can all give their take on the crisis as different organizations experienced different tipping points and dealt with different factors that created the crisis. A list of respondents is made and contacted. To come to a complete list of respondents and to avoid missing relevant actors an overview of responsible actors by the NIPV has been used as a source (ten Dam, 2018). This document contains an overview of the legally relevant actors within the refugee chain. From this overview came the following list of actors:

- COA (Central Agency for the Reception of Asylum Seekers)
- Municipalities
- Ministry of Justice and Security
- Ministry of Interior Affairs
- Safety regions

As the refugee crisis has eventually been declared a national crisis, the national crisis structure has been activated. This introduced one more actor: the NCTV (National Coordinator for Security and Counterterrorism). The national crisis structure introduces a meeting and decision-making structure (Van der Burg & de Jonge, 2022). These meetings are coordinated by the NCTV on behalf of the minister of Justice and Security, who is the responsible minister for crisis management (Ministerie van Justitie en Veiligheid, 2024-b). As the NCTV brings together the different ministries involved and given the time constraint of this thesis, the decision is made to reach out to the NCTV instead of the ministries.

This way, an interview with the NCTV can be seen as an interview on behalf of the ministries. A type of actor that was also introduced by the situation becoming a crisis situation were relief organizations like the Red Cross, RefugeeHelp and Doctors without Borders (respondent 1). The following list of organizations was reached out to:

- COA
- Municipalities
  - The municipality of Westerwolde
  - A municipality not in the province of Groningen
- Safety regions
  - The safety region Groningen
  - Another safety region that is not Groningen
- NCTV
- The Red Cross

When it comes to the municipalities and the safety regions two organizations are mentioned. One organization that was directly affected by the crisis in Ter Apel in Westerwolde, and one who was not. Unfortunately, not every respondent was available to give an interview. Given the time constraints of this project, it was made due with the respondents that were available. The respondents interviewed where from the following organizations:

- COA
- A municipality not in the province of Groningen
- The safety region Groningen
- Another safety region

These respondents were asked about their role in the situation, the period of build-up towards the crisis, when for them the crisis started and why they think the crisis started at that moment. The process to obtain informed consent for these interviews can be found in appendix B. The summarized, anonymized interviews can be found in appendix C.

4.2. Timeline

Based on the conducted interviews and on news articles a timeline can be written out. In Dutch there is a difference between refugees and asylum seekers. In this thesis only the word 'refugee' is used in order to avoid confusion.

4.2.1. Context

All refugees coming into the Netherlands have to right to ask for asylum. For this they need to be registered so their identity can be checked and it can be decided whether their circumstances gives them the right to a (temporary) residence permit that allows them to live in the Netherlands (for some years) (Het COA, n.d.). Refugees coming into the Netherlands first need to apply in Ter Apel, a town in the north of the country, in the province of Groningen, with the only application center of the country. Here the refugees are registered (Het COA, n.d.). After this procedure, they go to a regular accommodation center. Here they wait for the outcome of the asylum procedure. If the IND (Immigration and Naturalisation Service) decides the refugee is allowed a residence permit, the refugee waits in the accommodation center till a house is found in a municipality (Het COA, n.d.). These application and accommodation centers are run by COA. Where these centers are build and how many people are allowed to stay in a center is decided by the municipality as they are the authority to give out permits. It is also the task of the municipality to make sure people who have received a residence permit are provided with housing (respondent 7).

In the Netherlands there is a variable capacity for refugees (respondents 3 and 4). This means that the accommodation for refugees is lowered when the inflow of refugees decreases and needs to be increased with an increasing inflow. Through budget cuts over the years, COA is left without reserves or

buffers (respondents 2, 3 and 4; Kuiper & Van der Poel, 2022). A sudden increase in inflow cannot be easily dealt with. This can be combined with a decreasing willingness from municipalities to create accommodation (respondents 2, 3 and 4). An increase in inflow means COA needs to ask municipalities to create more accommodation. However, the whimsicality of the capacity of COA makes the municipalities more and more unwilling to do so: one year COA closes locations, the next year locations need to be opened again (respondent 2). After 2015 the inflow of refugees decreased for a few years in a row (respondents 3 and 4). Therefore, the capacity of COA decreased as well. In 2019 COA predicted that the inflow would start to increase again (respondents 3 and 4). Actions were taken to increase the capacity. Another 'wave' of refugees seemed to come towards Europe again. Before this wave could manifest itself, the COVID-19 pandemic hit the world and the inflow of refugees decreased to a minimum. Because of the pandemic the location in Ter Apel was closed and entry restrictions came in place (respondents 3 and 4). COA's plans to increase the capacity were put on hold. During the pandemic COA tried to work on scenario's to understand what might happen once the pandemic would be over (respondents 3 and 4).

Refugees who have received a residence permit are supposed to move out of their accommodation location into a home that is provided for them by the municipality. However, over the years the housing shortage in the Netherlands has also affected this. This means more and more accommodation is used by people who have a permit and 'should' not be in an accommodation center anymore (Kuiper & Van der Poel, 2022). These people make use of capacity that otherwise could be used by other refugees. Besides a housing shortage affecting the accommodation chain, the IND also has capacity shortages which affects this (Kuiper & Van der Poel, 2022). However, this is not something that really came up in the interviews and therefore will not be taken into account.

Any problems within the accommodation chain tend to show up in Ter Apel as this is the starting point for refugees (respondent 2). Capacity issues somewhere in the chain eventually become visible in Ter Apel as refugees might not be able to leave this starting point to go to an accommodation center somewhere else in the country. Whenever COA starts to predict that they are about to reach an occupancy rate of 93% in 3 weeks time, they have to report this to the Ministry of Justice and Security, that they are a part of (respondents 3 and 4). This way the Ministry is aware of arising problems in time.

4.2.2. Build-up

In the summer of 2021 the American army left Afghanistan, prompting the Taliban to seize power. Amidst the chaos, the Dutch government along with other governments evacuated people that had worked for the Dutch army. In the span of a few weeks a group of Afghan refugees came to seek asylum in the Netherlands (respondents 3 and 4; NOS, 2021-a). In this same period, across the world COVID-19 measures were relaxed, allowing more refugees to travel to Europe to seek refuge (respondents 3 and 4; NOS, 2021-b). The sudden rise in inflow was taken care of by the use of old military bases as accommodation locations (respondents 3 and 4). Late August 2021 the safety region Groningen starts to prepare for a potential crisis (personal communications, respondent 1, November 11, 2024). Early October the police expresses their worry towards the safety region as they see a rise in crime at Ter Apel (personal communications, respondent 1, November 11, 2024). Mid-October the chair and the director of the safety region Groningen have a meeting to discuss whether they should call GRIP 4 (personal communications, respondent 1, November 11, 2024). However, they do not see enough reason to do so, calling GRIP 4 would mainly be a statement toward the national government (personal communications, respondent 1, November 11, 2024). In the same month COA calculated that the occupancy rate was expected to be higher than 93% in 3 weeks (respondents 3 and 4). This was communicated with the state secretary. At the same time the safety region Groningen activated their GRIP-structure and called GRIP 2 (respondent 1) and decides to make use of article 51 of the Safety Regions Act (personal communications, respondent 1, November 11, 2024), this allows the safety region to ask the minister for help.

In the autumn of 2021, COA makes use of military bases (respondents 3 and 4). However, in December 2021, the state secretary responsible gave an instruction to multiple municipalities to provide accommodation within weeks (Ollongren & Broekers-Knol, 2021). This instruction was not received happily by these municipalities as they needed to deal with angry citizens (respondents 6 and 7). A few months later it is declared that the instruction had been unlawful and the state secretary makes

his excuses (NOS, 2022-a; respondent 7). However, by then the municipalities who had received the instruction had already set up accommodation (respondent 7). Which was supposed to be for a few weeks but ended up being in place for a longer period of time (respondent 6). During the winter of 2022 the situation seemed to be under control (respondent 3 and 4) and the safety region Groningen ended their GRIP 2 (personal communications, respondent 1, November 11, 2024).

In February of 2022 the war in Ukraine started. The safety regions were asked to help the municipalities to provide accommodation for the refugees from Ukraine. On March 9th a crisis was declared and the safety regions were asked to provide accommodation for a thousand Ukrainian refugees in two weeks per region and for another thousand refugees as fast as possible afterwards (Yeşilgöz-Zegerius & van der Burg, 2022). The COA initially dealt with accommodation. However, after taking care of five centers, it was clear COA did not have the capacity to take care of the Ukrainian refugees besides the 'regular' refugees (respondents 3 and 4). The accommodation for Ukrainian refugees did mean less room for capacity for refugees that COA had to take care of (respondents 3 and 4). This is why in the same letter to the safety regions in which they were asked for a thousand places for Ukrainians, they were also asked to coordinate accommodation for COA (Yeşilgöz-Zegerius & van der Burg, 2022). In March of 2022 COA tried to raise alarm (NOS, 2022-b). Over the course of a couple of weeks a few municipalities helped out and created temporary accommodation. The mayor of Groningen, who is the chair of the safety region Groningen, expressed his embarrassment about the situation in Ter Apel, as the location could not handle this many people. He compared Ter Apel to Lampedusa (NOS, 2022-c; respondent 2). In April, the 'kinderombudsvrouw', the national appointed official who defends children's rights, expressed her concern about the situation of children in Ter Apel (NOS, 2022-d). On the 26th of March, the safety region Groningen asked the state secretary for assistance (personal communications, respondent 3, November 22, 2024).

In May of 2022 a group of about fifty refugees in Ter Apel almost had to sleep outside (NOS, 2022-e). Eventually, they could sleep in the waiting rooms of the application center, without a bed. A day later the Red Cross jumped in to set up tents to prevent this situation from happening again, however, the safety region Groningen was able to arrange crisis emergency accommodation. About this situation the prime minister expressed his embarrassment (NOS, 2022-f). Over the course of a few weeks the COA was able to arrange for refugees to be moved to a different location to avoid them having to sleep outside (respondent 1). These arrangements were made very last minute, late in the evening and most of these different locations were only available for one night, causing the refugees to have to move again the next day.

Throughout the spring of 2022 discussions were held between the chairs and directors of the different safety regions (respondent 5). The safety region Groningen wanted the other safety regions to help out with accommodation (respondent 1). For some safety regions this was a dilemma. This type of crisis is not necessarily a crisis they have to deal with, especially since this crisis was created by political decision and not because of an high inflow of refugees (respondents 2 and 5). However, the safety regions are a very nice tool to use in situations like these, as they are organizations that can organize accommodation very quickly (respondents 2 and 5). Besides, the safety regions are a way of connecting the municipalities. However, the type of accommodation the safety regions can create is crisis emergency accommodation (respondents 2 and 5). This is not the type of accommodation that can be used for weeks or months (respondent 5). The situation posed a difficulty for some safety regions as it caught them in a political game. They are paid by the municipalities and the mayors make up the board. Providing accommodation is a task for the municipalities. Asking the safety regions to do this task for the municipalities could help these municipalities out greatly: they would not have to do it themselves but it would show the rest of the country they were putting in the work (respondent 5).

For the first of June, an agreement was made between the COA and the safety regions (personal communications, D. Vermeulen, October 1, 2024). The safety regions would accommodate a total of 600 refugees for 12 weeks. The regions would take turns, four regions at a time. Every 14 days four regions would accommodate 150 refugees each in crisis emergency accommodation. After these 14 days four other regions would do the same. This way the safety regions would help out the COA during the summer period during which the COA would have more difficulty looking for emergency accommodation because of the vacation period.

On the 17th of June 2022 the safety region Groningen called GRIP 4 (Veiligheidsregio Groningen, 2022).

Part of the reason for this was to send a signal to the national government (respondent 2). This GRIP 4 situation lasted a year (respondent 2). On the same day the Dutch government declared a crisis and activated the national crisis structure (Yeşilgöz-Zegerius et al., 2022). This state of crisis would last till the first of July 2023 (NOS, 2023). The safety regions were told to help provide accommodation as they were already doing for Ukrainian refugees. Every region had to accommodate 225 refugees in crisis emergency accommodation (personal communications, respondent 3, November 22, 2024). Besides this task, a total of 7500 people with a residence permit had to move out of the reception centers within 6 weeks, this would be a job for the municipalities (personal communications, respondent 3, November 22, 2024). Even though a crisis structure was activated, there was no noticeable difference for the safety region Groningen (respondent 2). Besides, a month later a group of hundred refugees were forced to sleep outside in Ter Apel as there was no place for them to go. This number of people sleeping outside would go up till it reached 700 by late-August 2022 (Van der Burg, 2022, NOS, 2022-g; NOS, 2022-h). For the municipalities that had already created accommodation the activation of the crisis structure did not change much either (respondents 6 and 7). For them it was a matter of letting other municipalities act first before they would start providing more accommodation (respondents 6 and 7).

4.3. The Refugee Crisis as Creeping Crisis

In the previous chapter, chapter 3, a description of a creeping crisis is given. This description can be put into practice by using it to test this case. First, a creeping crisis is about a threat to vital interests of society. In the case of the refugee crisis, this threat can be seen from different perspectives: a threat to the safety in Ter Apel; a threat to the health of refugees; a threat to the safety of refugees; or a threat to the right of refugees to ask for asylum. Different parties would, most likely, focus on a different threat. This matches with one of the elements of a wicked problem that sees that 'there is no definitive formulation' (Rittel & Webber, 1973). The situation can be seen as a wicked problem as respondent 5 remarked. There is no clear solution, no best solution and there is no room to test different solutions. The threat is not straightforward. Different elements come together to create a complex problem: inflow of refugees, housing shortages, budget cuts and the response from local residents. Even though a refugees crisis has happened before, it can be seen as a known unknown problem. This refugee crisis is very different from the crisis in 2015. It is created differently and will have to be solved differently. The unknown elements can be found in the geo-political factors such as refugees coming from Afghanistan in the summer of 2021 or the start of the war in Ukraine at the start of 2022. These aspects all show the uncertainty around the nature of the threat as can be found in the description in chapter 3.

When it comes to the incubation period respondents 3 and 4 show how this problem has been building up for years. Their story starts in 2018 when it was calculated that the capacity had to be increased. It could be concluded that this incubation period spans multiple years. This incubation period was created through the interacting factors such as a housing shortage and budget cuts. The lack of time pressure can mostly be found with the national government. Their response to the threat took time. Ministers and state secretaries were aware of the buildup to the threat but only in June 2022 a national crisis structure was activated. However, about 8 or 9 months before COA already asked for help. Of course it can be questioned whether the activation of the crisis structure was a necessary response. But the difference of so many months does show a lack of time pressure. The presence of time pressure can be found with the municipalities that where given an instruction. For them there was time pressure to create accommodation as fast as possible. This time pressure was created through an external decision. These aspects show an uncertainty around the creeping phase.

There is no clear end to the incubation period and therefore no precipitating event can be pointed out. Different respondents see a different start of the hot phase and none of these hot phases have a clear start to them: no such thing as an explosion or fire happened to mark the start of a hot phase. This shows uncertainty around the precipitating event. Besides this, there was also uncertainty around an acute response. The safety region Groningen decided to activate their crisis structure - first GRIP 2 and later GRIP 4. This can be seen as an acute response. The activation of the national crisis structure can also be seen as an acute response. However, these acute responses are months divided. Besides, it is unclear whether an acute response was necessary, especially since respondent 2 remarked that the response of activating the national crisis structure did not make a difference to the safety region

Groningen. These elements show uncertainty around the tipping point at the end of the creeping phase. All the mentioned characteristics can be found in table 4.1.

Altogether, the level of uncertainty, based on the levels of Walker et al. (2013), can be set on level 4. During the buildup of the crisis, there are multiple plausible futures. However, very little can be said about their plausibility. The futures cannot be ranked based on this plausibility. This shows that the uncertainty cannot be taken away by gathering more information.

Table 4.1: A summery of the factors that characterize the refugee crisis as a creeping crisis, their relationships and their effect.

Group	Factor	Can be found in the case of the refugee crisis	Effect on the refugee crisis
Uncertainty around the nature of the threat	Wickedness of the threat	It is not clear what the exact problem is. The crisis could be seen as an inflow-problem, accommodation problem or housing shortage problem.	It is not clear how to solve this problem, as the problem itself is not clear.
	Realm of (un)known unknowns	There are aspects influencing the crisis that are unknown. The war in Ukraine was an unknown and unexpected threat. The evacuation of people from Afghanistan was also not predicted.	Makes the crisis more uncertain as factors influencing the crisis have not been seen before and could not easily be foreseen.
	Complexity of the threat	The underlying system of refugee accommodation seems straightforward. However, factors such as budget cuts, a housing shortage and unwillingness from municipalities make the situation more and more complex.	Makes the crisis complex as different aspects of the threat (which are complex in themselves) interact with each other, enhancing the threat.
Uncertainty about the creeping phase	Long incubation period	The crisis has been building for years. In 2018 there were the first signs something might be going wrong.	This incubation period introduces the creeping phase. During this phase the threat is not prevented but is able to keep building.
	Lack of time pressure	There has been little time pressure for involved actors to act. This is visible in the multiple times the safety region Groninngen and the COA had to ask for help.	Allows the threat to keep building and creates uncertainty.
Uncertainty about the tipping point ending the creeping phase	Uncertainty around precipitating event	There is no clear start of the hot phase. No sudden onset can be found.	Makes it unclear for actors involved when to act.
	Uncertainty around acute response	The safety region Groningen decided to activate their crisis structure and the national crisis structure was activate. There was no clear reason behind the timing of these actions. Besides, it is unclear to what extend these actions helped.	Creates uncertainty for the safety regions as it takes away their regular response to crises. The activation of GRIP 4 has been mainly a way of adding pressure towards the national government, which is not the standard way of using GRIP 4.

4.4. Tipping Points

Without a precipitating event it is not clear when the creeping phase turned into the hot phase. However, through the interviews a few tipping points could be identified. These are moments that respondents pointed out as the start of the crisis for them or for their organization.

Firstly, the safety region Groningen saw two moments that could be seen as the start of a crisis: the start of GRIP 2 and the start of GRIP 4, the 20th of October 2021 and the 17th of June 2022. In regular 'flash crises' the start of GRIP or a change in GRIP level marks the start of a crisis or a big change in a crisis. Therefore, these two moments could be seen as tipping points, even though the situation is a creeping crisis instead of a flash crisis. This idea is strengthened through the fact that other organizations took action around these dates as well. Around the 20th of October COA took action as it was calculated

that the occupancy rate would be higher than 93% in a few weeks. For COA this date could be seen as a tipping point as well. The 17th of June is not only the start of GRIP 4 in Groningen, it is also the day the national crisis structure was activated. Therefore, this day could be seen as a tipping point on a national level.

Besides these two dates, there are three more dates that could be seen as smaller tipping points as these moments only affected one single organization for example. In December 2021 an instruction was send to multiple municipalities. This marks the start of the crisis for these municipalities, as this was the moment they were forced to act. On March 8th 2022 a crisis was declared when it came to Ukrainian refugees. This crisis also marked a change in the refugee crisis as municipalities and safety regions put their focus on the Ukrainian refugees. Besides, the available capacity needed to be shared with an enormous number of Ukrainian refugees. In the same month, on the 26th of March the safety region of Groningen asked for assistance from the state secretary (personal communications, respondent 3, November 22, 2024), showing their need for help. Finally, in July of 2022 the first instance of refugees being forced to sleep outside took place. For multiple respondents this moment was an ultimate low point. Therefore, it could be seen as a tipping point in a humanitarian crisis.

4.5. Factors

There are reasons behind the tipping points found in this chapter. These tipping points are no precipitating events and yet respondents do mention these moments as the start of a crisis. These are the reasons that make up the tipping points. Why a respondent sees a moment as a tipping point depends on the organization this respondent works for. It makes sense that for COA their focus lies on the in- and outflow of locations. For the safety regions and their GHOR health factors might be more important. Finally, for municipalities the response of their citizens will be an important factor.

These different perspectives on the problem is one of the elements of a wicked problem as ”there is no definitive formulation” (Rittel & Webber, 1973). These different perspectives are a symptom of a creeping crisis. Besides, the different factors also show the complexity of the threat, another element of a creeping crisis. All these factors interact with each other and increase the threat. The accommodation system is a fairly simple system without much complexity: there is inflow, there is a number of people in the system and there is outflow out of the system. However, with the crowdedness of the system and the different perspectives come different factors that start to interact with these three factors. Health factors come into play as there are too many people in a location. This high number of people might cause unrest within the location and introduces incidents. Public opinion is also introduced as COA needs municipalities to create accommodation quickly, as is shown by respondents 6 and 7. This creates a much more complex system than a simple system that can be summarized as ’inflow and outflow’.

Combining the answers from the respondents gives us a few types of factors: Movement, Public order and Security, Health and Attention. The movement factors are mainly mentioned by COA and safety region Groningen. Here, the inflow and outflow are the most obvious factors. However, occupancy rate is also mentioned by respondents 3 and 4 as a leading factor in decision-making. Respondent 1 also sees the amount of times a refugee has to move locations as an important factor. This factor ties into health related factors as well, as refugees having to move multiple times does not impact their health positively. Respondent 2 saw the underlying problem to the issue to be a housing issue as the percentage of refugees in accommodation are people with a residence permit.

The safety regions together with municipalities are responsible for public order and security in their region or municipality. However, dealing with social unrest is closely related to crime-related incidents the police has to deal with. This becomes visible through the fact that the police communicated a rise in crime with the safety region Groningen (personal communications, respondent 1, November 11, 2024). Besides, social unrest is a factor that is difficult to measure. Therefore, public order and security factors could be seen as the amount of incidents in and around a location and the amount of police responses related to a location.

Because of their GHOR health related factors are important to the safety regions. This could be measured through the amount of visits to GP’s, the amount of visits to a hospital, the amount of refugees being sick and the amount of deaths. Finally, the attention related factors can be seen as attention from

citizens and media attention. These factors were only mentioned by respondents 6 and 7. However, they can be tied to public order. All mentioned factors are brought together in the following list:

- Inflow
- Outflow
- Outflow to housing
- Occupancy rate
- Percentage of permit holders in accommodation
- Refugee movements between locations
- Visits to GP's
- Visits to a hospital
- Sick refugees
- Deaths in an accommodation location
- Police responses
- Incidents in and around an accommodation location
- Amount of media attention

This list and the found tipping points can be used by the approach found in the next chapter.

5

Establishing a Detection Approach

In the previous chapter, chapter 4, tipping points and factors have been found. In this chapter these will be combined to find whether there is an approach to detect these tipping points using the factors. For this, different potential approaches will first be looked for as there is no specific approach found in the literature in chapter 1. These different approaches are found by conversations with people from different safety regions and by brainstorming to see what approaches could potentially be used. After finding these approaches, a decision needs to be made which approach to use. Criteria help to make this decision. Finally, the chosen approach is tested out to see whether it can be used to connect the factors to the found tipping points and whether the approach can be used to detect these tipping points. In summary, this chapter first makes use of operationalization. This operationalization can then be used for empirical grounding.

5.1. Potential Approaches

In chapter 1 it was found that no approach for detecting tipping points has been worked out. However, there are different approaches that could be used for this purpose. To be able to make a list of potential approaches different conversations were held with people from different safety regions to see what approaches were already in use for similar issues and to brainstorm about this. From these conversations came four approaches for detection and monitoring:

- Continuity
- Thresholds
- Scenarios
- Patterns

These four approaches will be explained further before deciding on which approach to use. All these approaches come with advantages and disadvantages. These, along with criteria that will be formulated, will help with choosing which approach to use, as not all approaches can be tried out within the time limit of this research.

5.1.1. Continuity

This approach focuses on the continuity of the organization. The tipping point is reached once the organization can no longer function the way it normally does. This approach does not look at the potential crisis, but at its effects on the organization. Once the situation starts to influence the organization negatively, it will have reached a tipping point. Societal unrest might for some time just be a political problem or a problem for the police. However, when the point is reached that the protests and violence hinders emergency services like the fire department, it becomes a crisis for the safety regions. Similarly, this approach would mean that during an epidemic the safety region would only see this as a crisis in the hot phase once too many employees become sick for the organization to function properly.

This approach helps with answering the question ‘is this our problem?’ and helps to demarcate a situation. The safety regions have been struggling with this question. Creeping crises are often crises that are able to build because of a lack of political response. This introduces the question whether such crises are a problem that needs to be solved by the safety regions. Focusing on the internal organization helps give clarity and reduces the complexity of the problem. With this focus the safety regions can avoid getting sucked into situations that are not their problem. However, this way of thinking and only looking at the own organization does not suit the safety regions and one could wonder whether this is the right mindset. Besides, it is difficult to measure when and to what extent employees are being hindered in doing their job.

5.1.2. Thresholds

Thresholds are already used by the safety regions in their VIK’s. Thresholds are set for different indicators. These thresholds work like a traffic light. Once an indicator reaches a threshold the color changes from green to orange or from orange to red. This color change indicates a tipping point: the red light is a sign of the hot phase. Some safety regions already use this approach when monitoring different aspects such as drought. Here multiple indicators are monitored. When one or multiple indicators, such as the UV index, reach a threshold, the threat of drought ‘changes’ color.

The advantage of this approach is that it is already being used. Besides, this approach is very intuitive: when indicators get ‘worse’ colors change, once colors change to red, action is necessary. There is a direct link between the outcome of this approach and the uncertainty around the tipping points, as the outcome immediately reduces this uncertainty. However, in unknown unknown situations the thresholds might not be clear. When it comes to weather related crises, like droughts mentioned earlier, there are clear scientific thresholds as established by the Dutch meteorological institute (KNMI). In unknown or unclear crises these thresholds are not established. Besides, how to deal with crises that do not have a direct effect. Climate change affects the weather and this more extreme weather causes casualties. However, could the amount of casualties – which could be an indicator – from an individual natural disaster be used to monitor climate change?

5.1.3. Scenarios

Scenarios are already used during crises by the safety regions to map out what possible ways the crisis could develop. This approach makes use of this idea. Undesirable scenarios are created. Once one of these scenarios becomes reality, a tipping point is reached.

Just as with the approach that makes use of thresholds, an approach that uses scenarios is already familiar to the safety regions. This approach helps when it comes to sense-making. It can be seen as a way to reduce the uncertainty of the nature of the threat as it challenges the (un)known unknowns. However, it is impossible to write scenarios for every possible scenario. This could create situations where, according to the approach, no tipping point is reached as no thought-of scenario is becoming reality, while in reality it seems the creeping phase is turning into the hot phase with a scenario that no one could think of.

5.1.4. Patterns

This approach makes use of the idea that every situation follows a pattern. Once reality starts to deviate from this set pattern, this might be a sign a tipping point is reached. This approach could be used for the unknowable, or unknown unknown, crises. With these crises anomalies could be monitored to detect tipping points. These anomalies are the deviation from a set pattern.

A deviating pattern is a sign that something in the system is possibly going wrong. This approach helps in detecting unknown crises. It deals with the complexity of the threat. The approaches that make use of thresholds or scenarios rely on the imagination of the people creating the scenarios or defining the thresholds. The deviating patterns are found by algorithms and do not rely on people’s imagination. This way an unimaginable crisis could also be detected. However, as the creeping crises are wicked problems, ”the existence of a discrepancy representing a wicked problem can be explained in numerous ways” (Rittel & Webber, 1973). A deviating pattern in itself does not mean anything, it is a sign that something is different than before, but it is not necessarily a sign of a tipping point. This approach does not provide any sense-making. People working with the approach have to do this themselves

and therefore should understand the approach used. This requires an understanding of algorithms. Besides, this approach requires a lot of data, which might not be available to this extent.

5.1.5. The Effect of the Approaches on a Creeping Crisis

The found approaches are either products of a brainstorm or are approaches that are already in use for different crisis situations. The approach chosen should be able to deal with the factors surrounding a creeping crisis. As the found description in chapter 3 points out, the creeping crisis is surrounded by three types of uncertainty. As the creeping crisis is surrounded by a high level of uncertainty, the uncertainty cannot be taken away by gathering more information. However, an approach might be able to reduce this uncertainty. If a found approach is not able to reduce, in some way, some of the uncertainty, it is not useful.
When explaining the approaches in the previous subsections a few links were already made to some of the factors defining a creeping crisis from chapter 3. These relationships are made visible in figure 5.1. This figure contains the causal diagram from figures 3.1 and 3.2. In the figure the four approaches are added to show how they help reduce the uncertainty of a creeping crisis.

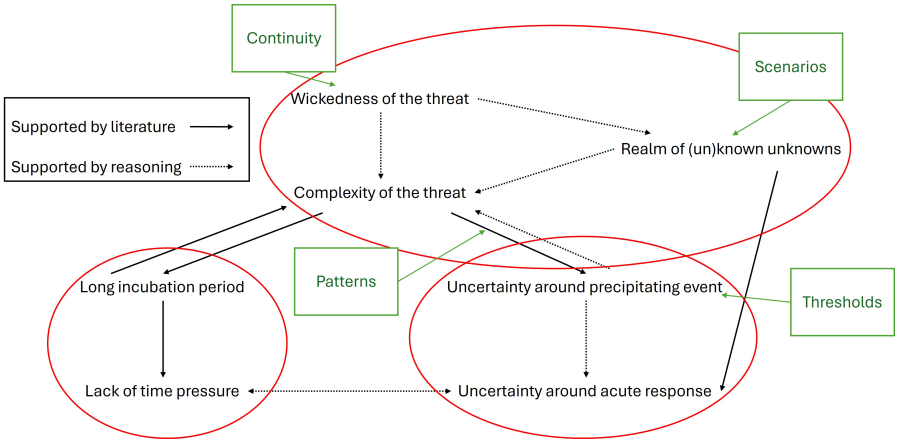

Figure 5.1: The causal diagram of the factors that define a creeping crisis and the potential approaches with their effect on these factors.

Figure 5.1 shows how the approach of *continuity* mainly affects the wickedness of the threat. This approach helps in defining the threat in a way that reduces the complexity. When focusing on the continuity of the organization, all other elements of the threat are disregarded. This reduces the wickedness of the threat as the problem is made much smaller and simpler. Through this narrow focus the threat becomes easy to define. This effect of the approach of *continuity* causes the uncertainty of the nature of the threat to decrease, causing all other uncertainties to decrease as well.

The approach of *thresholds* directly affects the uncertainty around the precipitating event. This approach shows the state of the threat through an intuitive system. When all lights are red it is clear a tipping point is reached. This directly reduces the uncertainty around the precipitating event. This approach shows when the creeping phase comes to an end. The approach reduces the uncertainty around the tipping point of the threat.

The approach of *scenarios* affects the 'unknowability' of the threat. The scenarios help to understand the threat and the potential directions it might take even in (un)known unknown situations. Through these scenarios the uncertainty around the nature of the threat is reduced. Just with the approach of *continuity*, a reduction of the uncertainty of the nature also cause a reduction of the uncertainty of the tipping point and a reduction of the uncertainty as a whole.

The approach of *patterns* affects the creeping crisis in a different way compared to the other approaches. The other approaches all affect a specific factor. This approach affects the relationship between two factors. This approach looks at the way the complexity of the threat leads to the uncertainty around the precipitating event. It uses the interacting factors of the threat to find how the complexity changes and creates a tipping point. The concept behind this is that the complexity of the threat - the way the

different elements of the threat interact with each other - would change when a tipping point is reached. The approach uses this to reduce the uncertainty around the tipping point.

5.2. Criteria

In the previous section all approaches with their advantages, disadvantages and effects are explained. This way, a choice can be made in what approach to use. In order to make this decision, criteria have to be set up. As found in the previous section, all approaches reduce the uncertainty that make up a creeping crisis. However, they all do this in different ways. This thesis focuses on the tipping point at the end of the creeping phase of a creeping crisis. Therefore, it would be preferable to make use of an approach that directly reduces the uncertainty around this tipping point. However, approaches that do not do this directly, still reduce this uncertainty indirectly as shown in figure 5.1. The decision which approach to use also comes with other criteria as the context in which the approach is used is also relevant.

While the approaches are used to reduce the uncertainty around the tipping point, they have to encounter the uncertainty of the nature of the threat as well. When looking at figure 5.1, both the uncertainty around the creeping phase and around the tipping point are created by the uncertainty of the nature of the threat. The chosen approach will have to deal with the complexity of the threat, the 'unknowability' and the wickedness in order to work and help detect a tipping point. These three factors make up the uncertainty around the nature of the threat and influence all other factors.
The complexity of the threat, influenced by the wickedness and the 'unknowability', shows the interacting aspects of the threat. These interactions build up the threat, but also make it difficult to understand what the issue is exactly. To be able to use an approach, it is important to understand what it is used for and how it is used. The complexity of the threat makes this difficult. This understanding matters as it helps decide what input data to use and how to interpret the outcomes. Besides, the understanding increases the reliability of the approach as the outcomes can be explained if necessary.
The realm of the (un)known unknowns adds to this that the approach will have to be 'scalable' to a variety of creeping crises. In this thesis, the approach will only be tested on one case. However, the factor of the realm of the (un)known unknowns shows that the approach also needs to be prepared for other creeping crisis that do not exist yet and might not be imaginable yet.

Adams (2015) gives words to these criteria. Adams (2015) lists four nonfunctional requirements for the viability of systems. This ties into the goal of the approach selection in this thesis, as viability is about the approach or, in the case of the study by Adams (2015), the system being put to use. This is what the approach can be selected on. Reliability, efficiency or traceability, for example, are important factors when it comes to the design of a system. However, in this case, the system has not being designed yet and so the different approaches cannot be tested on these criteria. However, we can test the four approaches on which approach would work best, is the most viable, in practice. In Adams (2015), the criteria are as follows: *understandability*, *usability*, *robustness* and *survivability*. The first three criteria and their implications for the four approaches will be explained one by one. The last criterion, survivability, will not be taken into account as this is a criterion that applies to the vulnerability of a system, about which very little can be said when it comes to an approach that has not been designed yet. Therefore, the following list of criteria is found:

- Understandability
- Usability
- Robustness

5.2.1. Understandability

The criterion of understandability looks at whether the people who would end up using the approach can understand the workings of the approach. These people are the CaCo or the people working for a VIK. They would be the ones to use the approach and draw, helped by experts, conclusions based on the outcome. Therefore, these people need to have an understanding of how the approach works and what needs to be done in order to obtain an outcome. The approach, therefore, will have to make sense of the complexity of the threat.

The approach that looks at continuity can be seen as quite an understandable approach as the approach

has a logical structure: if continuity is hindered, it is a crisis. However, 'continuity' is relatively vague and needs to be well worked out in order for this approach to be fully understandable. This criterion asks for a clear definition of the term 'continuity'.

The approach of thresholds is more understandable than the approach that looks at continuity. As said before, the approach is very intuitive: the colors change when the numbers are above a certain threshold. Besides, the fact that the approach is already in use helps with the understandability of it: the approach needs very little explaining for the staff working with it.

The approach of scenarios has an understandability similar to that of the approach of thresholds. The approach has a similar intuitiveness and the approach is already used. However, creating scenarios is less straightforward than setting thresholds. Especially since different safety regions use different techniques for scenario building (Luesink, Wolbers et al., 2024). These different ways to make scenarios make it more difficult or confusing to fully understand how the scenarios came to be.

The approach of patterns has a very low understandability. Many articles have been written about explainable AI (XAI) (for example, by Yu (2023)). This says something about the difficulty of algorithms. Even experts have difficulty understanding algorithms, it cannot be expected from a CaCo or someone who works for a VIK to completely understand an algorithm that finds deviating patterns.

5.2.2. Usability

The criterion of usability looks at whether the people using the approach can end up using it properly and can interpret the outcomes. The criterion of understandability influences the use of the approach. If people understand the approach, it will be easier to use the approach. However, understanding of the approach does not mean it will be easy to interpret the outcomes. Therefore, the focus will be on the interpretation of these outcomes. Of course, understanding will, most likely, make interpretation easier.

The usability of the approach that looks at continuity can be tricky. As mentioned before, if continuity is hindered, this could be a sign of crisis. This seems quite straightforward and for a professional easy to interpret. However, the approach does not explain what kind of crisis is happening as it only shows *something* is affecting the organization. This might make interpretation of the outcomes very difficult. Besides, since the approach is limited to the continuity of the internal organization of the safety regions, no signs of crisis does not mean there is no crisis. Just because the continuity of the safety region is not affected does not mean there is no crisis to deal with.

The approach of thresholds is very usable as the approach is intuitive. The interpretation of a color change needs some effort. The different factors help with this, as it is traceable what change in the data caused a change in color. A call to the right experts to ask for an interpretation of the change in data is the only thing that is needed for an interpretation of the outcomes.

The approach of scenarios is not as usable as the approach of thresholds but is better usable than the approach that looks at continuity. Similarly to the approach of thresholds an interpretation of an outcome is quite easy. Especially since the scenarios could tell what crisis is happening. However, similarly to the approach that looks at continuity, a lack of outcome, no sign of crisis, does not mean much. The approach is dependent on the scenarios made. As mentioned before, if something happens that was not 'predicted' with a scenario, this might not show up with this approach.

The approach of patterns is, because of a lack of understandability, not very usable. As mentioned before, this approach asks for great effort when it comes to interpretation of the outcomes. A deviating pattern in itself means very little. Therefore, the usability of this approach is very low.

5.2.3. Robustness

The criterion of robustness looks at whether the approach can still be used correctly under changing circumstances. Here the complexity of a creeping crisis and the (un)known unknowns come into play. This means the approach, in the future, might have to detect the tipping points of very complex crises that no one could think of. It is important the approach is still useful even in these situation as this would increase the reliability of the approach.

The approach that looks at continuity is not very robust as it does not take complexity into account.

Through the complexity of a crisis it might be possible for the continuity of the safety regions to not greatly be affected while a crisis is happening. This approach does not take this possibility into account. Besides, the narrow view of this approach makes it difficult to keep the possibilities of unknown unknown crises in mind.

The robustness of the approach of thresholds is very uncertain. Through more and more complex crises the usability of the approach might decrease as interpretation becomes more difficult. However, it is unclear what effect unknown crises will have on the outcomes of the approach. Changes in data will still show up using this approach, no crisis is imaginable that does not change the data even when a tipping point is reached.

The robustness of the approach of scenarios is not very high as only a limited amount of scenarios can be created. The more complex the creeping crises become, the more likely it will be that a situation will become reality that was not 'predicted' by a scenario. Besides, with unknown unknown crises it will be impossible to create scenarios.

The approach of patterns is the most robust approach. This is the case as, as long as there is enough data to use as input - which is not guaranteed -, this approach will always point out when a pattern starts to deviate. It could even be argued that this approach will get better over time, as each moment there will be more data that can be used as input. Besides, algorithms are made to deal with complexities that humans cannot understand. Therefore, this approach can be very useful for dealing with an increasing complexity.

5.2.4. Conclusion

Having listed the criteria and their connections with the four potential approaches, a decision can be made about the approach that will be used in this chapter. Table 5.1 shows a summary of how the different approaches score on the different criteria and on how they affect the uncertainty of a creeping crisis.

Table 5.1: A summary of the approaches and criteria

	The effect on the uncertainty of the tipping point	Understandability	Usability	Robustness
Continuity	Indirect effect	-/+	-/+	-
Thresholds	Direct effect	++	++	?
Scenarios	Indirect effect	+	+	-
Patterns	Direct effect	-	-	++

Taking the scoring into account, a choice can be made to continue with the approach of thresholds. This approach directly affects the uncertainty of the tipping point and is very understandable and usable. The only downside to this approach is the fact that the robustness is uncertain. However, the only approach with a high robustness is the approach of patterns, which scores very low on the other two criteria. The approach of scenarios scores similarly to, but slightly lower than, the approach of thresholds. Besides, it has an indirect effect of the uncertainty. The approach that looks at continuity does not score high on any of the criteria. It has a medium score for understandability and usability, scores low on robustness and has an indirect effect on the uncertainty.

5.3. Data

At the end of chapter 4 a list of factors can be found. These factors can be seen as the input variables to test the chosen approach. However, not every variable is available. The following variables are available for the period of 2021-2022 and used:

- Inflow (Ministerie van Asiel en Migratie, 2025)
- Outflow (Ministerie van Justitie en Veiligheid, 2025)
- Occupancy (Ministerie van Asiel en Migratie, 2024-b)
- Refugees with residence permit in accommodation (Ministerie van Asiel en Migratie, 2024-b)
- Refugees in custody (Ministerie van Asiel en Migratie, 2024-a)

The period of 2021-2022 is focused on as most of the respondents started their 'story' around the summer of 2021. This was the moment most of the COVID-19 measures ended and people were evacuated out of Afghanistan. Therefore, the year 2021 is seen as a start. None of the respondents mentioned a tipping point in 2023. Because of this, 2022 is seen as the latest end of the creeping phase.

Besides the listed variables, there are three variables available for the year 2021 but not for the year 2022: refugees that have received housing, refugees that move to a different location and refugees that have passed away in an accommodation location. This last variable only has a value above 0 in three out of twelve months. Because of the very low number of data points, this variable is not used. In this section the listed variables will be plotted and explained.

The plot in figure 5.2 shows the inflow of refugees into the Netherlands over time. Each month in 2021 and 2022 the inflow in that month is shown. There is a clear difference between the time before the summer of 2021 and after this moment, as the inflow the first few months of 2021 is significantly lower than later in time. The winter of 2022 is also clearly visible in the data: in December of 2021 there is a small decrease in inflow which continues to decrease in January and February of 2022. However, March of 2022 shows a great increase in inflow that is similar to the increase of inflow in August of 2021 when the Afghan refugees entered the country. When looking at thresholds for only this variable, the inflow in October of 2021 is not at its highest level since the start of 2021. Solely based on this variable it could be said that August of 2021 would have been much more of a tipping point instead of October. The inflow in June of 2022 is not as high as the inflow in October of 2021. When looking at this variable it would have made more sense to call March of 2022 a tipping point instead of June of 2022 as the number of inflow for this month is much higher, almost as high as the inflow in October of 2021.

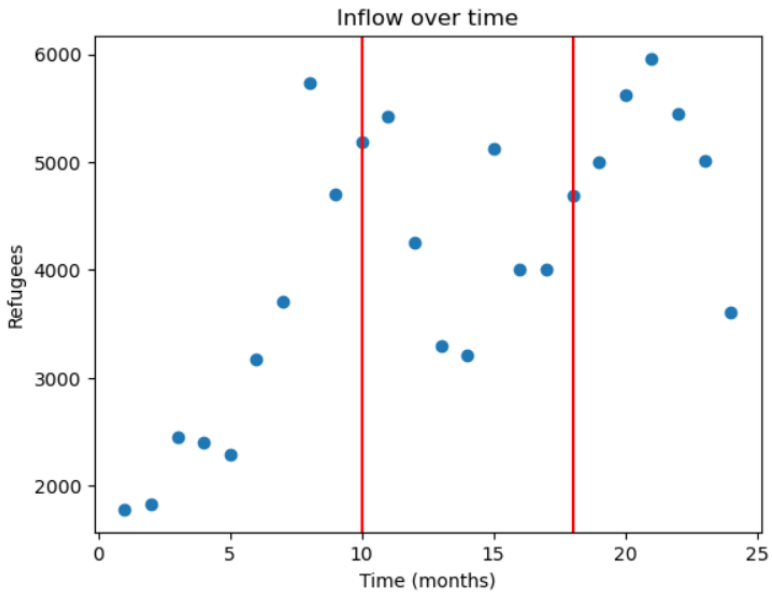

Figure 5.2: Inflow of refugees over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

Where figure 5.2 shows the inflow of refugees, the plot in figure 5.3 shows the outflow of refugees out of the system. This outflow can have different reasons and different directions. Most refugees leave the system as they have received a residence permit and the municipality has provided them with a house. Some refugees leave the system as they leave the country as their application for a permit has been denied. A third group leaves a location to move to a different accommodation location. Figure 5.3 shows an internal variable. Policy decisions can change the outflow of refugees relatively quickly. This is visible when looking at the last few months of 2021. It is known that the safety region of Groningen and COA both raised the alarm in October of 2021: November of 2021 sees a major increase in outflow. When looking at threshold values it is clear that in October of 2021 the outflow had been decreasing for a few months. However, October of 2021 does not see an all time low value for outflow. The outflow is

much lower at the start of 2021. The tipping point of June of 2022 is also not visible from this variable alone. The outflow in June of 2022 is lower than the outflow a month before. However, in January, February and April of 2022 the outflow is much lower than in June. The outflow in these three months is even lower than in October of 2021.

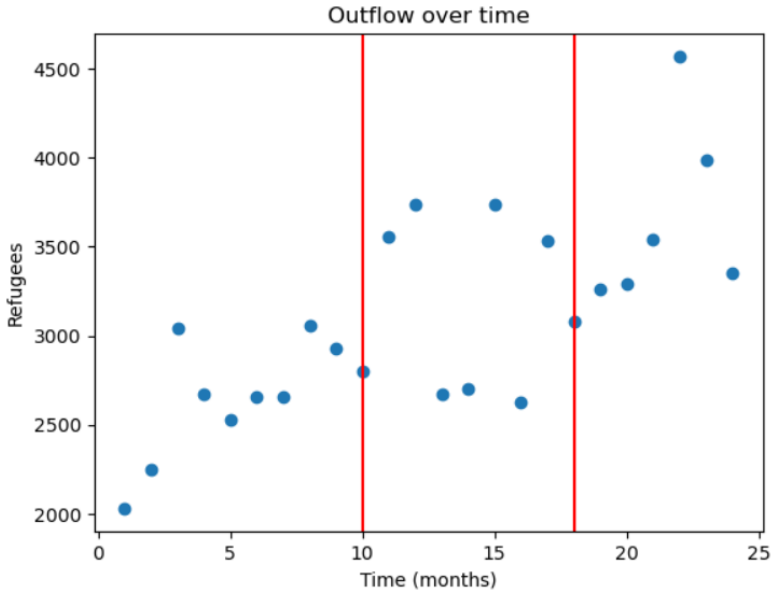

Figure 5.3: Outflow of refugees over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

While figures 5.2 and 5.3 show varying changes in in- and outflow of refugees over time, figure 5.4 shows a stable picture. The plot in figure 5.4 shows the occupancy of COA locations over time. Here, the difference in scaling of the in- and outflow becomes very visible: the inflow is almost always greater than the outflow. There are clear increases in occupancy during the period of July till November of 2021 and March till October of 2022. Whether these increases can be attributed to an increase in inflow or a decrease in outflow does not become clear with only the plot in figure 5.4. Based on this variable alone, given the approach of thresholds, there could only be one tipping point in the time period between the summer of 2021 and late-2022 as the occupancy keeps rising.

Not all refugees staying at an accommodation location are waiting for the result of their application for a residence permit. A number of the residents of these locations has already received a residence permit, but has not received housing yet. This number is shown in the plot in figure 5.5. The flow of this plot is quite similar to that of the plot in figure 5.4. The number of occupants seems to correlate heavily with the number of permit holders. Therefore, when looking at the approach of thresholds, given this one variable, the results are similar as with the variable of occupancy: there can only be one tipping point as the variable keeps rising. However, it is difficult to compare the two variables as the range of values differ greatly between the variables.

The plot in figure 5.6 does just this. This figure shows the percentage of permit holders living in accommodation, allowing the combining of the variables 'occupancy' and 'permit holder'. Figure 5.6 shows the peaks when it comes to the percentage of permit holders: around June of 2021 and around July of 2022. An increase of this percentage is either owning to a relative low growth of the total number of refugees in accommodation or owning to a relative high increase in the number of permit holders. Combining this plot with the plots in figures 5.4 and 5.5 it seems most likely that the peak of June of 2021 is mainly because of the first reason mentioned and the peak of July of 2022 because of the second reason. When looking at the approach of thresholds, solely based on this variable, June of 2021 should have been a tipping point. The tipping point of October of 2021 can not be spotted based on this variable. The percentage in this month is just as high as the month before. The percentage in June of 2022 is quite higher. However, it is not far as high as the percentage a year before.

While the previous figures mainly focused on the 'logistics' of refugees, the plot in figure 5.7 looks at

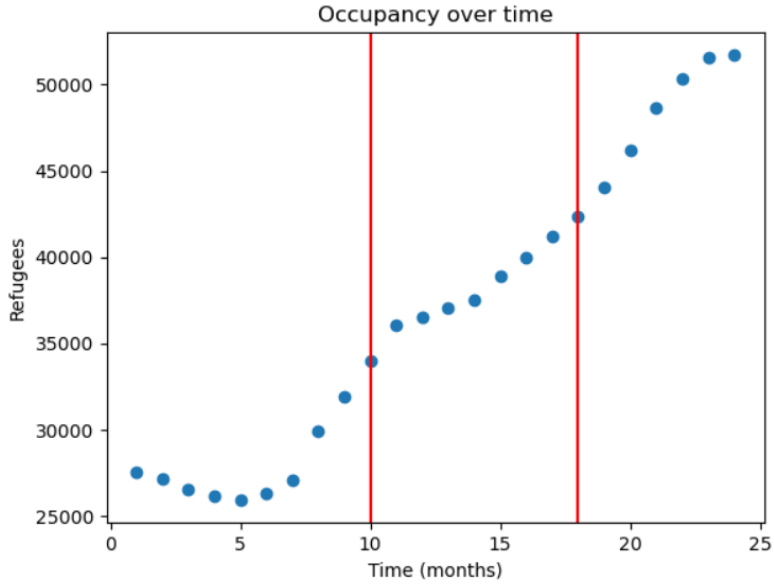

Figure 5.4: Occupancy of COA locations over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

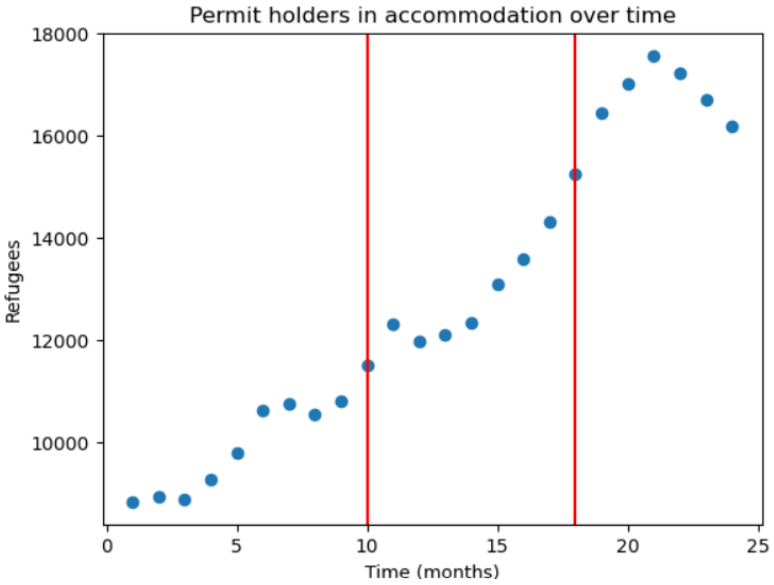

Figure 5.5: The amount of refugees with a residence permit in an accommodation location over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

public order and security issues. This figure looks at the amount of refugees that the national police has to deal with. Refugees who break the law and are put in custody are treated differently from 'regular' Dutch citizens. These refugees are called VRIS (Vreemdelingen in de strafrechtketen/ Aliens in the criminal justice chain). When refugees are put in custody, the Avim (alien police) or Kmar (Royal military police) have to send a file to the DT&V (Dienst Terugkeer en Vertrek / The Repatriation and Departure Service). Generally, this is done immediately after a detention order (Ministerie van Jusitie en Veiligheid, 2021). The plot in figure 5.7 shows the amount of files send to the DT&V per month. It would make sense that a rise in the amount of refugees in the system (occupancy) would result in more cases for the Dutch police. In fact, 2022 saw more incidents and crime at accommodation locations compared to 2021 (Noyon et al., 2024). However, the first half of 2021 has the highest number of cases per month while this number drops significantly in June of 2021. After this moment the number of cases varies between 50 to 90 per month. It has to be noted that the national police rounds the number of

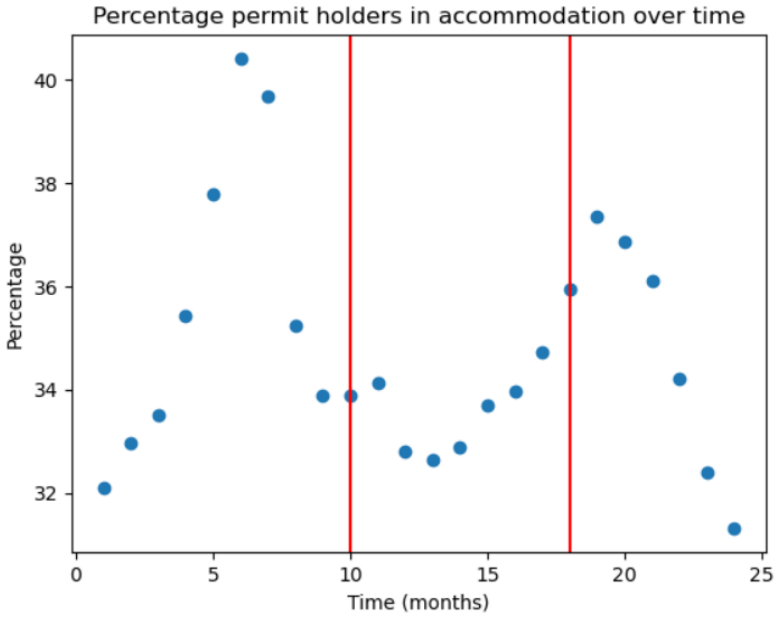

Figure 5.6: Percentage of refugees in COA accommodation locations with a residence permit over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

cases per month to tens. However, when taking the approach of thresholds into account, based on this variable, the tipping point should have been reached early-2021. Because of the small variation after June of 2021, very little can be said about the tipping point of October of 2021 and June of 2022.

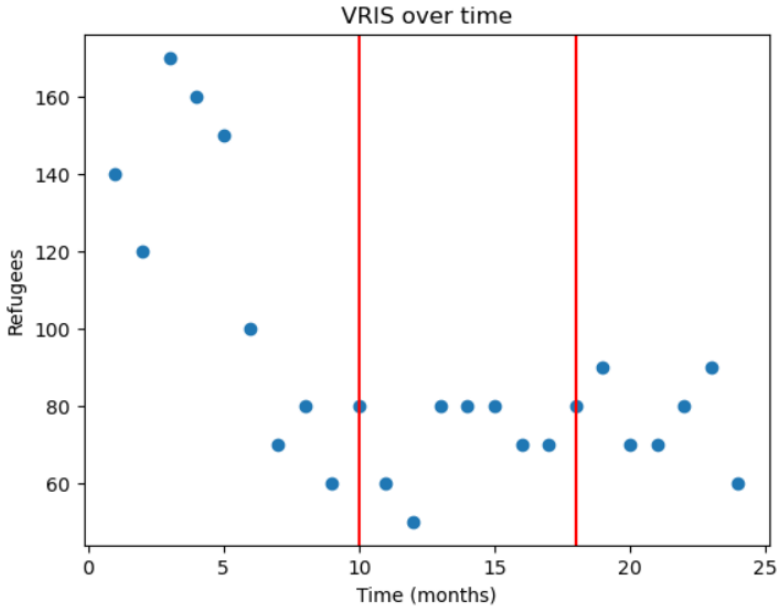

Figure 5.7: The amount of refugees in the criminal justice chain (VRIS) over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

5.3.1. Linear Regression Analysis

A dataset containing the outflow of refugees over 2021 also contained the number of refugees leaving a location to move to a different location and the number of refugees moving to their own house. However, this data is not available for 2022. This subsection looks at a way to still make use of the available data.

To explore the available data further, the correlations between the variables are looked at. What stands out is that some of the correlations between the variables that are only available for the first year and the variables that are fully available are quite high. These correlations can be found in table 5.2. As can be seen in the table, some of these correlations are higher than 0.8, as the correlation between inflow and Throughput is 0.852 and between housing and outflow is even 0.990.

Table 5.2: Correlations between the variables that are only available for the year 2021 (Throughput and Housing) and all variables

	Inflow	Throughput	Housing	Outflow	Occupancy	Permit holders	VRIS	Percentage permit holders
Throughput	0.852	1.000	0.604	0.633	0.868	0.835	-0.696	-0.226
Housing	0.683	0.604	1.000	0.990	0.710	0.736	-0.543	-0.086

These high correlations show there might be a possibility to conduct a linear regression analysis. If this is possible, a linear regression model could help to fill in the gap of data in 2022. For both dependent variables, Throughput and Housing, the linear regression model is created in the same way. First, all variables that are available for both 2021 and 2022 are used as independent variables. Secondly, a new model is created leaving out one independent variable with the lowest absolute value of the t-statistic. This step is repeated till only statistically significant coefficients are left. Each model has an adjusted R-squared value. The model with the highest adjusted R-squared is chosen as the model to use further.

A choice is made to focus on the adjusted R-squared value when choosing which model to use and not pay much attention to the significance of the calculated coefficients. The dataset that is used as input to calculate the model is very small. The model is created with very little data points. This means that the standard deviation of the variables needs to be very high in order to have a significantly high t-statistic as the standard errors tend to be high because of the small sample size. This means that with such a small sample size the coefficients are not often statistically significant.

The adjusted R-squared value gives an idea of the performance of the created model. The 'regular' R-squared value shows how much of the variance of the data is explained by the model. The more independent variables are added to the model the higher this value: more variables can add more nuance to the model. However, when adding variables, there is a risk of over-fitting. The adjusted R-squared takes this risk into account: this value does not necessarily increase when adding independent variables.

Even linear regression models with a high R-squared and high adjusted R-squared value might not be suited to describe the data. The amount of data on which the models are based is very small. The input data for the model is time series data with a time span of twelve months. These twelve data points per variable is very little. Therefore, drawing significant conclusions based on these models will not be possible. Besides, the models come with an assumption about correlations in times of crisis. A linear regression model is based on correlations between variables. In the model, these correlations stay the same over time. It can be strongly questioned whether this is the case in times of crisis. However, even given these two points, creating these models is the best way of having more data to use and to test the approach.

Throughput

First, linear regression models are made with throughput as dependent variable. Table 5.3 shows the coefficients and their p-value of each variable in each model. For each model it also shows the R-squared, adjusted R-squared and F-statistic. The chosen model, model 2, explains 92.2% of the variance of throughput. The adjusted R-squared is the highest of all calculated models. The F-statistic shows whether the calculated model is better than a model with only the mean of the dependent variable. The p-value of this F-statistic is 0.003 which means the F-statistic is statistically significant.

In table 5.4 the included independent variables and their coefficients can be found. This table also includes the standard error and the t-statistic. From this table it can be concluded that not all coefficients, like the ones for *outflow* and *percentage permit holders*, are statistically significant.

Table 5.3: The statistics of the linear regression models that use Inflow, Occupancy, VRIS, Outflow, Percentage permit holders and Amount of permit holders as independent variables and Throughput as dependent variable.

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-2847.3 (0.329)	-665.8 (0.045)	-262.6 (0.039)	-254.5 (0.045)	-163.6 (0.031)
Inflow	0.0337 (0.067)	0.0241 (0.029)	0.0265 (0.025)	0.0226 (0.037)	0.0174 (0.049)
Occupancy	0.1004 (0.361)	0.0174 (0.014)	0.0107 (0.017)	0.0085 (0.023)	0.0072 (0.029)
VRIS	0.7753 (0.080)	0.7403 (0.074)	0.4131 (0.224)	0.329 (0.322)	
Outflow	-0.0515 (0.096)	-0.0442 (0.102)	-0.0290 (0.254)		
Percentage permit holders	7247.0 (0.404)	636.6 (0.154)			
Amount of permit holders	-0.2525 (0.443)				
R-squared	0.932	0.922	0.888	0.863	0.844
Adj. R-squared	0.850	0.857	0.823	0.811	0.809
F-statistic	11.36	14.22	13.82	16.77	24.29

Table 5.4: The outcomes of the linear regression model chosen with throughput as dependent variable. For each independent variable included in the model its coefficient, standard error and t-statistic.

	Coefficient	Std. err.	t-statistic
Constant	-665.7797	263.910	-2.523
Outflow	-0.0442	0.023	-1.926
Inflow	0.0241	0.008	2.842
Occupancy	0.0174	0.005	3.401
VRIS	0.7403	0.343	2.159
Percentage permit holders	636.6320	389.785	1.633

The coefficients found in table 5.4 can be used to predict the values of *throughput* for the year 2022. The results of this prediction can be found in the plot in figure 5.8. The first half of this plot contains both the available data and the data predicted by the linear regression model. The second half of the plot only contains the predicted data. When taking the threshold approach into account, the throughput in October of 2021 is at it highest point since the beginning of 2021. This point is reached again in March of 2022. Based on only this variable it could be argued that if October of 2021 is a tipping point, then so is March of 2022. Just like October of 2021, June of 2022 sees the highest value of throughput since the start of 2021.

Housing

The linear regression models with housing as dependent variable are made in the same way as the models with throughput as dependent variable. Table 5.5 shows the coefficients and their p-value of each variable in each model. For each model it also shows the R-squared, adjusted R-squared and F-statistic. The chosen model, model 5, explains 98.3% of the variance of housing. The adjusted R-squared is the highest of all calculated models. The F-statistic shows whether the calculated model is better than a model with only the mean of the dependent variable. The p-value of this F-statistic is $9.6 * 10^{-9}$ which means the F-statistic is statistically significant.

In table 5.6 the two included independent variables and their coefficients can be found. This table also includes the standard error and the t-statistic. From this table it can be concluded that the coefficient for *percentage permit holders* is not statistically significant.

The coefficients found in table 5.6 can be used to predict the values of *housing* for the year 2022. The results of this prediction can be found in the plot in figure 5.9. The first half of this plot contains both the available data and the data predicted by the linear regression model. The second half of the plot only contains the predicted data. When taking the threshold approach into account, similar things can be said about this variable compared to the variable of outflow. The lowest housing can be found at the start of 2021. If, at any moment between early-2021 and late-2022, a tipping point is reached, solely

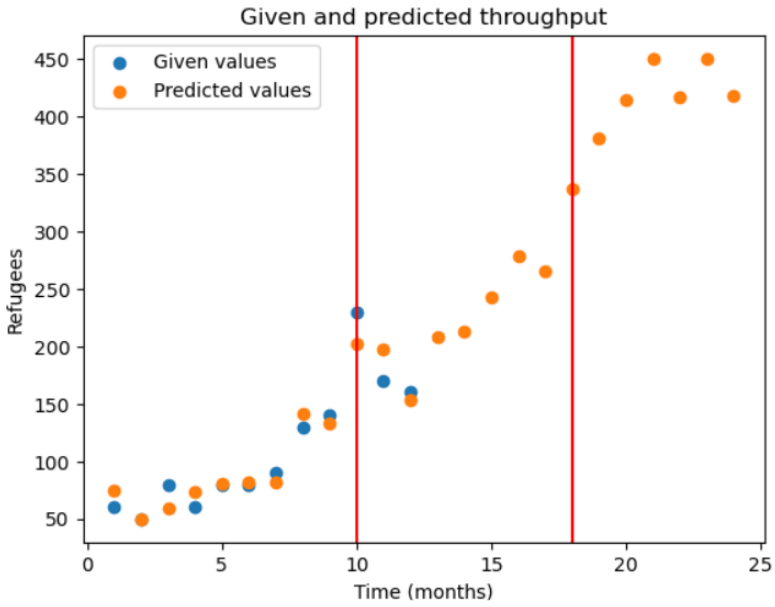

Figure 5.8: The amount of refugees that have to move location over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022), the available data and the results of the linear regression analysis. The red vertical lines emphasize October of 2021 and June of 2022.

Table 5.5: The statistics of the linear regression models that use Inflow, Occupancy, VRIS, Outflow, Percentage permit holders and Amount of permit holders as independent variables and Housing as dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-2554.6 (0.801)	-1032.5 (0.096)	-931.5 (0.027)	-1019.5 (0.008)	-1050.6 (0.005)	-706.7 (0.000)
Outflow	0.9276 (0.000)	0.9331 (0.000)	0.9410 (0.000)	0.9450 (0.000)	0.9039 (0.000)	0.8966 (0.000)
Percentage permit holders	5748.7 (0.851)	1149.3 (0.235)	1196.7 (0.175)	1118.6 (0.177)	919.1 (0.223)	
Amount of permit holders	-0.2025 (0.862)	-0.0273 (0.627)	-0.0369 (0.341)	-0.0210 (0.433)		
Inflow	0.0259 (0.644)	0.0193 (0.538)	0.0169 (0.539)			
VRIS	0.3402 (0.803)	0.3085 (0.800)				
Occupancy	0.0578 (0.880)					
R-squared	0.986	0.986	0.986	0.985	0.983	0.980
Adj. R-squared	0.969	0.974	0.977	0.979	0.980	0.978
F-statistic	58.06	83.19	119.9	172.3	267.6	497.9

Table 5.6: The outcomes of the linear regression model chosen with housing as dependent variable. For each independent variable included in the model its coefficient, standard error and t-statistic.

	Coefficient	Std. err.	t-statistic
Constant	-1050.5626	285.266	-3.683
Outflow	0.9039	0.039	23.046
Percentage permit holders	919.1194	702.100	1.309

based on this variable this should be at the start of 2021. October of 2021 sees the lowest value of housing in the span of three months. June of 2022 also sees a low value compared to the month before. However, April of 2022 sees an even lower value, this value is even lower than October of 2021.

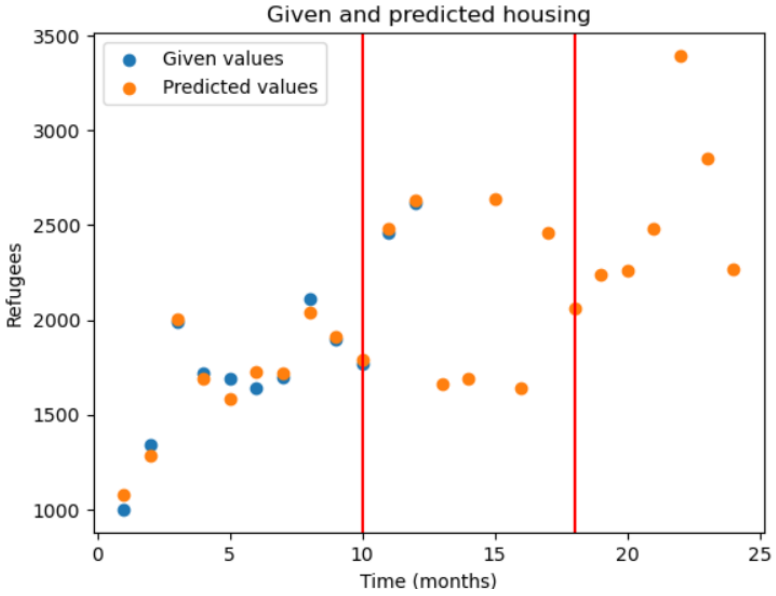

Figure 5.9: The amount of refugees that move to a provided house over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022), the available data and the results of the linear regression analysis. The red vertical lines emphasize October of 2021 and June of 2022.

5.4. Results

With help of two linear regression models eight different variables can be used. All these variables have been plotted and they all have a side of the story to tell. An increasing inflow of refugees puts more stress on the system and increases the threat. At the other side of the system, an increasing outflow of refugees relieves some stress and reduces some of the threat. Part of this is visible for the figures 5.2 till 5.9. These figures all show increasing or decreasing signs of a crisis. However, the variable *VRIS* seems to be different from the other variables. Looking at figure 5.7, this variable does not show to increase or decrease the level of crisis: the amount of VRIS cases drops significantly before the summer of 2021 and varies around the same value throughout (the build-up of) the crisis. It is clear this variable cannot be used to define tipping points since the variable changes very little in value. Why this is the case is not clear. However, it does cause this variable to be excluded in the further analysis.

Even though all variables (except for VRIS) seem to tell a part of the story, it is clear thresholds cannot be easily set to identify tipping points. None of the variables show tipping points for October of 2021 and/or June of 2022. It could be concluded that, because of the interactions of the factors, setting individual thresholds for each variable will not produce the desired outcome of the two tipping points. Since the variables influence and interact with each other, it might be better to only look at the complete picture instead of individual variables.

5.4.1. Normalization

First, all variables can be shown in the same plot. However, these variables all have a different range. In order to deal with these differences in scale, the variables have been normalized. This way the variables can be compared and trends can be spotted more easily. Normalization transforms the data to fit between the values 0 to 1: the lowest value of a variable gets the value 0 and the highest value of a variable the value 1. For a variable as *inflow* this means a value of 1 is the highest level of threat to the system. The same goes for values such as *occupancy* or *amount of permit holders*. However, for the two variables *housing* and *outflow* this level of threat to the system is reversed: a high outflow is positive for the system and a low outflow increases the level of threat. Therefore, when normalizing the variable, these two variables are reversed: the lowest value gets the value 1 and the highest value the value 0.

Since the variables all have the same range after normalization, the variables can be shown in the same plot. This plot can be found in figure 5.10.

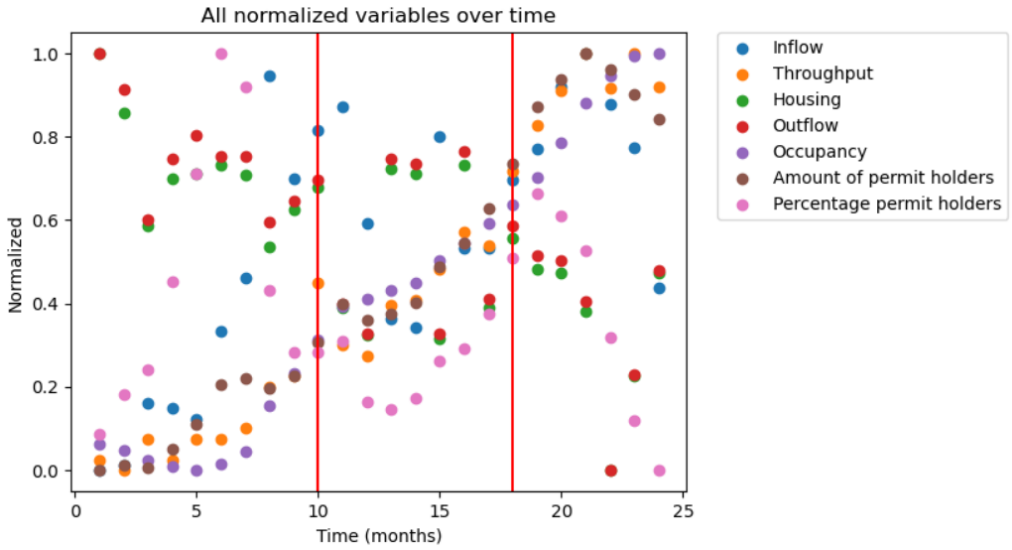

Figure 5.10: Normalized variables with 1 being the highest level of threat to the system and 0 being the lowest level of threat, over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

The plot in figure 5.10 shows many data points. However, no trends can easily be found from this plot. *Throughput*, *occupancy* and the *amount of permit holders* does seem to show similar trajectories. The similarities between *occupancy* and the *amount of permit holders* has already been established earlier and since *throughput* is partly made up out of these two variables, it is not surprising they seem to correlate highly. Similarly, as *housing* is largely made up out of the variable of *outflow* these variables too, seem to follow similar trajectories.

Where the plot in figure 5.10 focuses on the values of the variables, in reality the sense of crisis or experience of a threat might also be linked to the speed of the increase of a threat. If one or more variables change rapidly between two months, this might increase the sense of crisis more than a slow change - even if the actual values of the variables are very high. To test this, the change of the variables over time are also taken into account. Each month the change of the variables compared to the previous month is calculated. This is a percentage change. Again, the variables *housing* and *outflow* are reversed as a rise of these variables is positive while this is not the case for all other variables. Therefore, the negative of the percentage changes of these two variables are used. Because the values of the changes are percentages, there is no need for normalization: the variables have a similar range. These changes are shown in the plot in figure 5.11.

The plot in figure 5.11 shows most variables clustering around or a bit above 0%. The most extreme values are either +60% or -60%. However, most values are between -20% and +20%. Like the plot in figure 5.10, this plot also shows no obvious trends. It is clear, however, that the percentage changes of the variables *inflow*, *throughput*, *housing* and *outflow* are much more extreme than the percentage changes of the variables *occupancy*, *amount of permit holders* and *percentage permit holders*. These last three variables are much more clustered around 0% than the first four variables. The variables *inflow* and *throughput* tend to be between -20% and +60%, while the variables *housing* and *outflow* tend to be between -60% and +40%.

5.4.2. Principal Component Analysis

Based on the data found and the plots created alone, very little can be said about the found tipping points from chapter 4. These seven variables all have their own trajectories, they do not all increase and decrease at the same time. Seven variables are also too many to detect tipping points with. It is very difficult to detect trends when looking at seven variables. This problem could be solved using a principal component analysis (PCA). This analysis replaces variables with new and less variables while trying to maintain the original variance of the data. Using a PCA would reduce the amount of variables, making it easier to detect tipping points. The downside to this analysis is that the created variables

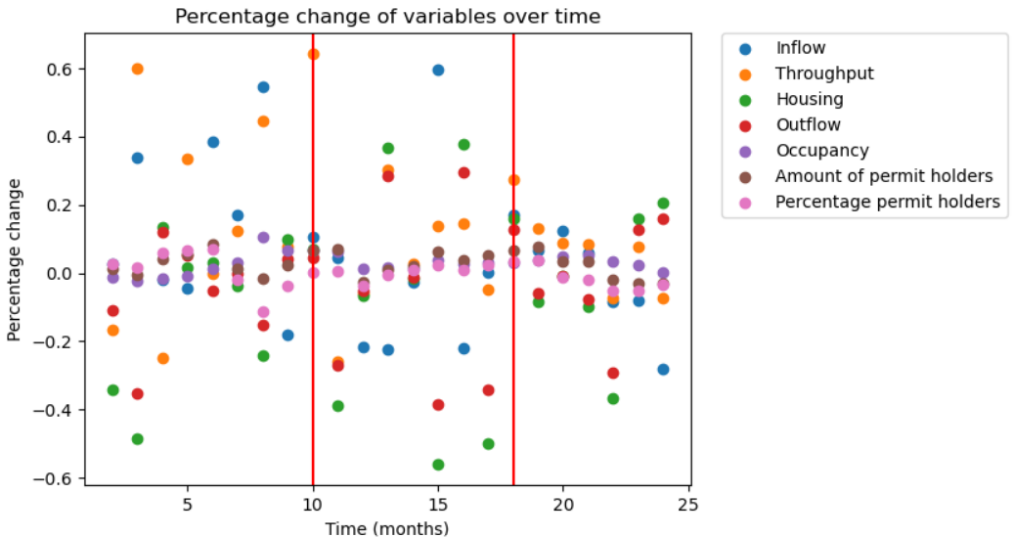

Figure 5.11: Percentage change compared to the previous month over time in the period 2021-2022 per month (with month 2 being February of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

have no meaning. While the variable *inflow* has a practical meaning in real life, a variable made up out of different variables has no meaning: an inflow of 2000 means something, a new variable with the value of 0.75 has no meaning on its own. The outcome of the PCA using the normalized variables can be found in table 5.7.

Table 5.7: Outcomes of a PCA using all seven variables. Only the first three components are shown as these components have eigenvalues above 1.

	Eigenvalues	Explained variance ratio	Variables						
			Inflow	Throughput	Housing	Outflow	Occupancy	Permit holders	Percentage permit holders
Component 1	3.241	0.744	0.361	0.496	-0.268	-0.282	0.487	0.483	-0.048
Component 2	1.334	0.126	-0.447	0.105	0.091	0.063	0.261	-0.034	-0.841
Component 3	1.095	0.085	0.406	-0.338	-0.448	-0.475	-0.190	-0.329	-0.388

This table 5.7 shows three components. These are the first three components that are the outcomes of the analysis. These are the only components with an eigenvalue above 1. Besides, the explained variance ratios of these components are relatively high. The first component explains around 74% of the variance of the data, the second explains around 13% and the third explains around 9%. Adding a fourth component would add very little more variance. Therefore these three components are used to create three variables. The first component is mainly made up out of *throughput*, *occupancy* and *amount of permit holders*. The second component is mainly made up out of *percentage permit holders* and *inflow*. The third component uses *housing*, *outflow* and *inflow* as its main sources.

The created three variables can be shown in a plot. This plot can be found in figure 5.12. In this plot all three components are shown. Two vertical lines are also included to show the two main tipping points of October of 2021 and June of 2022.

While the second and third component show no clear trend, the first component does show a trend over time. The trend of component 1 might be matched with the timeline from chapter 4: until July of 2021 the situation seems to be stable, from August of 2021 till the end of 2021 the situation becomes more difficult, during the winter of 2022 the situation seems to settle down somewhat, starting from March of 2022 the situation worsens until after the summer of 2022. Until October of 2021 the situation according to component 1 had not been this extreme before. This level of threat continues to be high till the winter. The level of threat of October of 2021 is surpassed in March of 2022. In June of 2022,

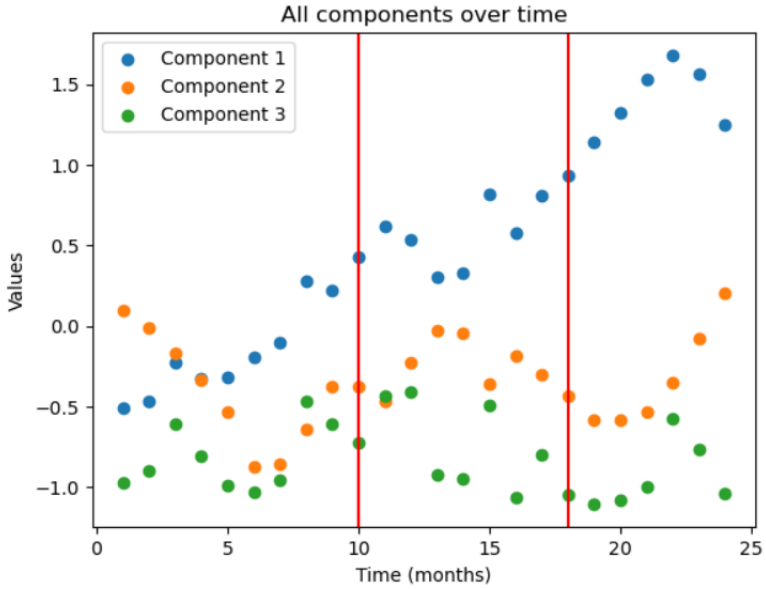

Figure 5.12: The three components that are the result of the PCA using the seven variables over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

the second tipping point found, the level of threat, according to component 1, surpasses even the level of March of 2022. After this, the level rises every month until November of 2022.

The outcomes of this PCA show that, when combining the variables, it might be easier to spot tipping points. Of course, when only looking at component 1, it is still difficult to identify a threshold as the value of component 1 is different for the two moments in time that were identified as the tipping points in chapter 4. However, in this situation the combining of variables makes it easier to understand what is happening. Figure 5.12 is easier to understand than figure 5.10. A combined variable can be made more sense of than all individual variables. Still, setting a threshold is an issue. However, with less variables, less thresholds need to be set.

The explained outcomes are outcomes of a PCA using the normalized values of the seven variables. However, the percentage changes of these variables have also been calculated. For completeness a PCA is conducted using these percentage changes as input. The outcomes of this PCA can be found in table 5.8.

Table 5.8: Outcomes of a PCA using the percentage changes of all seven variables. Only the first three components are shown as these components have high eigenvalues.

	Eigenvalues	Explained variance ratio	Variables						
			Inflow	Throughput	Housing	Outflow	Occupancy	Permit holders	Percentage permit holders
Component 1	1.704	0.589	0.497	0.062	-0.703	-0.505	0.015	0.015	0.001
Component 2	1.219	0.301	0.398	0.869	0.246	0.158	0.027	0.015	-0.009
Component 3	0.664	0.089	0.763	-0.488	0.341	0.222	0.019	0.093	0.075

This table 5.8 shows three components. These are the first three components that are the outcomes of the analysis. The first two have an eigenvalue above 1. The third component does not. However, the explained variance ratio of this third component is still quite high. Therefore, a choice is made to include this component as well. The first component explains around 59% of the variance of the data, the second explains around 30% and the third explains around 9%. Adding a fourth component would add very little more variance. Therefore these three components are used to create three variables. All components are mainly made up out of the first four variables *inflow*, *throughput*, *housing* and *outflow*.

As found before, the percentage changes of these four variables have a higher variance compared to the other three variables. The first component is mainly made up out of *housing* and *outflow*. The second component is mainly made up out of *throughput* and *inflow*. The third component uses *inflow*, *throughput* and *housing* as its main sources.

The created three variables can be shown in a plot. This plot can be found in figure 5.13. In this plot all three components are shown. Two vertical lines are also included to show the two main tipping points of October of 2021 and June of 2022.

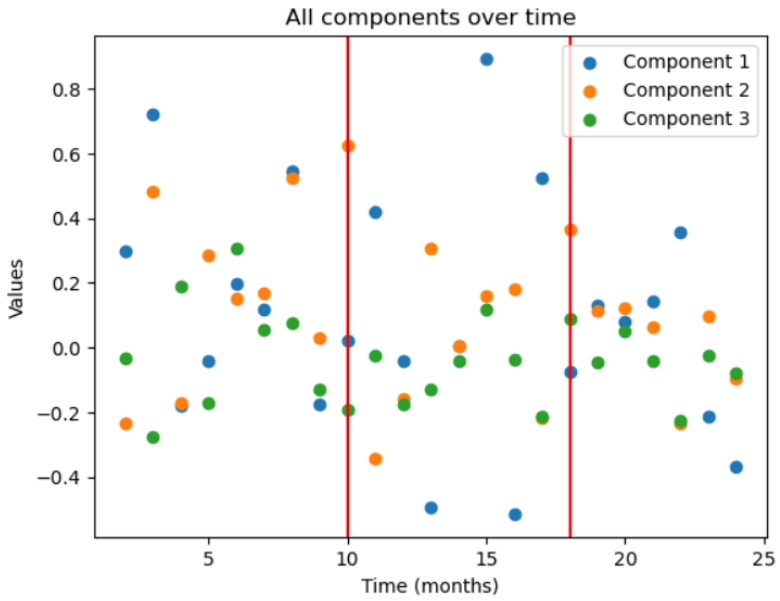

Figure 5.13: The three components that are the result of the PCA using the percentage changes of the seven variables over time in the period 2021-2022 per month (with month 1 being January of 2021 and month 24 being December 2022). The red vertical lines emphasize October of 2021 and June of 2022.

The results found in figure 5.13 are much less straightforward as the results found in figure 5.12. For none of the three components a trend can be found. However, when looking at the two found tipping points it can be noted that for October of 2021 component 2 reaches its maximum level. The same component reaches its highest level since October of 2021 in June of 2022. However this level is not as high as in October of 2021. As March of 2022 popped up when looking at figure 5.12, it is interesting to take a look at this month in figure 5.13 as well. Here it is interesting to see that component 1 reaches its maximum level in that month.

Still, component 1 in figure 5.12 seems much more straightforward than any of the components in figure 5.13. Based on the available data it could be said that the percentage change plays a much smaller role than the values of the variables when it comes to identifying tipping points. When setting thresholds for component 1 in figure 5.12, tipping points might be identified. This does require more interpretation of the values of the component.

6

Discussion

In the previous chapters the findings of the research are drawn up. This chapter discusses these findings before a conclusion is drawn in the next chapter. First, the findings are validated. Second, the limitations of this research are pointed out and discussed. Lastly, recommendations are made for policy and further research.

6.1. Validation

In order to increase the reliability of the findings it is important to validate them. The first finding of this thesis is the description of a creeping crisis. For validation, this description has been run past a number of respondents that have contributed to the formulation of this description. First, it can be checked whether their contribution has been understood correctly. Some of the characteristics of a creeping crisis, that the description is based on, came from literature. However, other characteristics came from respondents. By checking what they think of the characteristics and the description it can be checked whether the information they have given has be correctly interpreted. Second, it can be checked whether they agree, not only with their own contribution, but with the description in general. The respondents are all people that come across the concept of a creeping crisis in their work, they all intuitively understand this concept. They might not have been able to come up with all of the characteristics and with the description on their own. However, when they read the description they will be able to form an opinion about it. Five respondents have been asked for their opinion. Four respondents agreed with the found description. One respondent was still hesitant whether a separate definition or description is necessary. However, the respondent did not disagree with the found description.

A similar way of validation has been done for the conducted interviews about the refugee crisis. These interviews have been recorded and summarized. These summaries are send back to the respondents to check whether their words have been interpreted correctly. This is not only a way to validate these findings, it is also important from the view of handling data. These respondents have given their consent to be interviewed and for their answers to be used. However, it is only proper to check whether they agree with the finished product. Six of the seven respondents were send the summary of their interview. One respondent no longer works for the organization they were employed at at the time of the interview. None of the contacted respondents disagreed with the summaries.

Some of the respondents have given an extensive overview of the refugee crisis. With them, the findings of the principal component analysis in chapter 5 can be discussed. These findings, especially in figure 5.12 seemed to be a good summary of the buildup of the refugee crisis. To validate this, this has be checked with the respondents that have dealt with the refugee crisis across the whole of the time span. The respondents asked for their opinion have not responded to this question. For further validation their opinion can be further pursued.

Finally, different approaches have been found in this thesis. One of these approaches has been tested. However, why this approach seemed most promising is based on criteria. For further validation this choice can be shared with employees working for one of the VIKs to hear their opinion.

6.2. Limitations

The research also comes with limitations. Discussing these limitations brings more nuance to the findings. First, the main limitation of this research is the fact that only one case study has been conducted. Because of this, the found description and the found approach could only be tested on one example in one country. Of course, there are only a handful of other examples within the Netherlands. There are not many cases that the approach could have been tested on. However, if the approach had been tested on multiple cases instead of one, this would have greatly increased the validity of the findings.

Second, only one approach of the list of four has been tested. This one approach seemed the most promising approach of the four. However, the other three might have worked better than it seemed. The only way to know this is to test it. Of course, testing an approach does very little to improve the understandability or usability of this approach. An approach that makes use of algorithms might work very well when tested, but the big leap that needs to be made when it comes to interpretation is not changed by the test. However, the criterion of usability is very much focused on the practitioners and might not matter as much to researchers. Still, it is a limitation to this research that a choice for an approach has been made before an approach could be tested. Because of this, a surprisingly well-working approach might have been disregarded.

Third, from the interviews came a number of variables and factors that, according to the respondents, showed them or led to a tipping point. Unfortunately, not all this data was available when testing out the chosen approach. This is a great limitation to this research. Other data could have painted a very different picture. Especially the lack of data on capacity or occupancy rate seems to be the main limitation. In the interview with respondents working for COA this occupancy rate seemed to be the main variable based on which many choices where made. It would have been very interesting to use this variable as well when testing the approach. Adding another variable might have made the situation more complicated as it would mean more information to take into account. However, this extra variable might also have turned out to be the main variable when trying to spot tipping points.
Another interesting variable would have been a variable about the health of the refugees. From the perspective of the safety regions with their GHOR this seemed to be one of the most important indicators of the situation. However, COA could not share this data as the organization does not keep track of it. Similarly to the variable of occupancy rate, adding one or multiple variables about health might have made it more difficult to test out the approach as adding more data might only have created an information overload. However, those variables might also have turned out to be very important when looking for a tipping point. This uncertainty about the implications of a lack of data could only be solved by finding and including the missing data.

Tied to this lack of data is the absence of 'future' data. When it comes to a crisis, often indicators for the future situation can be found. The COVID-19 pandemic shows this in the 'reproduction number', for example. This information, in a way, shows a part of the future situation. For the refugee crisis a similar indicator can be found in the inflow of refugees into the EU. When refugees enter the EU it is known that after an amount of time a part of this group will enter the Netherlands. An increase of inflow into the EU will, with some delay, lead to an increase of inflow in the Netherlands. It can be argued that this information strongly influences the threat level of the situation. A high inflow into the EU will increase the urgency of the situation in the Netherlands as 'a high inflow can be expected in a few weeks'. At the same time a low inflow into the EU will decrease the urgency as 'we do not need to act now, the inflow will decrease in a few weeks anyway'. It would have been interesting to see the effect of this type of data on the tipping point.

Similar to this, the fact that the study is conducted in hindsight can be seen as a limitation. Firstly, this is a limitation as hindsight comes with hindsight bias. Tipping points and factors that seem obvious now might not have been obvious at the time. Therefore, it is relatively easy to draw conclusions in hindsight. Secondly, the normalization of the data and the PCA is possible because data is available for the whole time span. Without complete data, the outcomes of the PCA might have been very different. This gives limitations to the findings. It can only be said that the found approach *might* help with detecting a tipping point as it is only tested in hindsight.

Besides a lack of data, a lack of respondents is a limitation to the research. Not all actors that played a role in the refugee crisis were available for an interview. Because of this, none of the respondents

worked for a ministry. A respondent from the NCTV or from one of the ministries involved could have given their take on the crisis and could have added valuable insights. The tipping point of June 2022 could have been better explained. The reason behind the activation of the national crisis structure could not be found based on the conducted interviews. Besides more and different reasoning, more respondents could have added more factors to take into account when testing out the approach. Altogether, a more diverse group of respondents would have added more perspectives to the time line, the tipping points and factors.
Other respondents that have been missed when studying the case of the refugee crisis is the municipality of Westerwolde and a relief organization like the Red Cross. The municipality of Westerwolde is the municipality that Ter Apel is a part of. Their perspective could have added much to the story. However, since two employees of the safety region Groningen *have* been interviewed a part of the story has been shared after all. A relief organization such as the Red Cross could also have shared an interesting perspective. Their reasons for stepping in and helping out in Ter Apel would have added more factors to taking into account when testing out the approach. However, more respondents would have also made the story more complicated and it can be imaginable that more stories, more tipping points and more factors would have made it even more difficult to have some findings when testing out the approach.

Tied to the lack of respondents is the limitation that the case of the refugee crisis happened a few years ago. This makes the findings from the interviews less reliable as respondents might not remember certain aspects of the crisis as well anymore. Especially since the testing out of the approach relied on accurate information about when certain events happened. However, since the crisis has been such a public one, many statements could be verified through news articles. To add to this, because of the amount of time that has passed, more perspectives are available by now that might not have been available at the time. Since some time has past, some journalists have already been able to do some research about the complexity of the crisis. Through the passage of time the narrative has been able to shift from 'there is a lack of accommodation' or 'the inflow of refugees is too high' to 'there might be more to this problem such as a housing shortage and budget cuts'. However, this added perspective can also be seen as hindsight bias.

Next, the fact that this case is so highly political is a limitation to this research. The political side to the issue makes the issue overly complicated. When identifying the tipping points in chapter 4 it is not always clear whether a tipping point is the result of the buildup of the crisis or the result of political decisions. Without these political decisions the tipping points might have been placed at different moments by the respondents. Besides, during the interviews it was noticeable that respondents were side tracked due to current political choices. These aspects made it difficult to stay focused on the issue of 2021-2022 instead of the issue in the current moment. However, these issues show how much the safety regions, still a non-political actor, are affected by political decisions and inaction. Even though the political side of the issue made the research more difficult, it did show the reality of the world of the safety regions when it comes to dealing with creeping crises.

Lastly, when choosing an approach to use, the approaches where scored on different criteria. The approach of thresholds scored best on all criteria, except for *robustness*. How this approach scores on this criterion is unknown and uncertain. This means the approach is chosen on incomplete information. This is a limitation of this research. However, since the approach scored highly on all other criteria, the impact of this limitation is not very big. Besides, the analysis used, the Principal Component Analysis, is a universal tool. It can be used for all kinds of crises with all kinds of variables. This increases the robustness of the found approach. Of course, it is still unknown whether a PCA can be used when it comes to other crises.

6.3. Recommendations

Based on the findings of this research and its validation recommendations can be made, taking into account the research's limitations. These recommendations are twofold: recommendations for policy and recommendations for further research. The recommendations for policy are recommendations to the safety regions. This section will dive into both types of recommendations.

6.3.1. Policy

One of the main limitations of this research is a lack of available data. This lack of data would have been a limitation regardless of the chosen approach. It is recommended to the safety regions to start monitoring the different creeping crises they might have to deal with. Even though this research does not have a definitive answer as to the exact approach that can be used for detecting tipping points, starting to monitor the situation will provide more data to use in the future. Without data collection through monitoring testing out or using an approach in the future will be impossible.
Of course not all available data can be collected. Similarly not the whole world can be monitored. Besides, the more (unnecessary) data is collected the more data management and data safety issues arise. Therefore, it is important to start collecting data that is necessary. First, a decision needs to be made what to monitor. It is natural to start monitoring the ongoing creeping crises first. Next, the question arises what aspects of an ongoing creeping crisis to monitor. This ties into the question about the task of the safety region which is a recommendation that will be explained further on in this section. An overview can be made of the different aspects of the crisis. Here, a choice can be made to only focus on the aspects that are related to the task of the safety regions. These aspects can be further specified with indicators. By collecting the data on these indicators, the creeping crisis can be monitored once the approach is further worked out.

Throughout the study of the case of the refugee crisis it became clear that not all safety regions agree with whether certain crises are their job - whether they should be involved in responding to these crises. While the safety region Groningen saw that the safety regions might have a task when it came to organizing crisis emergency accommodation, respondent 5 did not see it this way. This shows the question 'what is our job?' that was already posed in chapter 1. As more and more crises cross the borders between the safety regions, it is important for the safety regions to think about this question together. If some regions think differently about this question, it will become more difficult to work together and it will not be a sign of unity. As respondent 1 showed, the lack of help from the other safety regions gave a feeling of loneliness. Besides, a disagreement on this topic might have a negative impact on the relationships between the different regions in general. Respondents 6 and 7 showed how a municipality that *was* organizing accommodation did not what to organize more before other municipalities would start organizing accommodation. A different answer to the question 'what is our job?' might produce a similar effect. One or more safety region might end up dealing with a creeping crisis that *they* see as their job, while others are doing nothing as they do not see it as their job.

A complete answer to the question 'what is our job?' will, most likely, never be found. New creeping crises will continue to be introduced that will ask for a re-evaluation of the opinion of the safety regions. Besides, an unanimous answer to the question will not be likely. As respondent 5 pointed out, the safety regions are governed by the municipalities. It cannot be expected that the mayors of the different municipalities all agree on the same demarcation of the tasks of the safety regions. However, it would still be important to talk about this question as it gives the safety regions some understanding of the different opinions that can be found in the different regions.

To conclude, it is recommended to talk about the role of the safety regions and to do this in unison to strengthen the position of the organizations. Of course, the future is uncertain and with this come unaccounted for crises. Therefore, it is important to keep a conversation about the demarcation going to make sure new types of crises that had not been imagined before are also talked about when they arise.

Lastly, it is recommended to the safety regions to think about how to act during the monitoring of a creeping crisis. Currently, research is conducted within the different safety regions and by the NIPV to the way the safety regions can respond to this different type of crisis once it enters the hot phase. Especially since the regular crisis structure as found in appendix A is not suitable for crisis that last longer than a few hours or a few days. However, this is about the response in the hot phase. Little attention seems to go to the creeping phase besides monitoring.
It can be questioned whether the only job for the safety regions during a creeping phase can be found in monitoring. Does the knowledge that a crisis might be developing not bring a responsibility to share this knowledge or to try to prevent the crisis? It is recommended to think about this responsibility. The smallest of the two mentioned tasks, sharing the knowledge, could be to share the knowledge with relevant partners. The bigger task is preventing a crisis to develop further. This might require lobbying

for national policies. As mentioned before, the safety regions are non-political actors. This would introduce quite a new task. It might be tricky for the non-political safety regions to pick up this task, as this might change the public image of the organizations. However, this could be solved by letting the chairs of the regions, the different mayors, be the spokesperson. These mayors already have more of a political image and could use their authority to urge policy-makers and politicians on a national level to act in order to prevent a creeping crisis from developing further.

6.3.2. Further Research

This thesis found a list of potential approaches that could be used to detect tipping points. Based on a few criteria one approach, the most promising one, has been chosen to be tested out. This test has shown that the approach could be used. However, more research is needed to be able to apply the approach in practice. Besides, the other three approaches are discarded based on their perceived effect, usability, understandability and robustness. While the approach that looks at the continuity of the organization was deemed to have a too narrow view by employees from safety regions, the other two approaches were seen as interesting to explore. It is recommended that further research finds how the thresholds approach can be used in practices and how the approaches that make use of scenarios and of patterns might help the safety regions make more sense of the creeping crises they encounter.

Thresholds

It is recommended to test the found approach that makes use of thresholds on different cases. The findings of this research showed that the approach of thresholds might work in practice. However, how exactly it could be used was not the focus of this thesis. This has to be further worked out. This thesis showed that tipping points could be based on the values of variables, especially when they are combined into less variables. When this is possible, thresholds can be set. However, how this works out is not found. Besides, the approach has only been tested on one case, while it has been concluded that none of the creeping crises are the same. Therefore it is important to find whether the approach could also work for other cases for further empirical grounding. These two issue can be combined into one recommendation for further research. By testing the approach on a different case it can be tested whether it works for other crises as well *and* it can be further worked out how the approach could be applied in practice. Of course, these two issues could also be researched separately.

The advice is to start the research with a past crisis, for example the COVID-19 pandemic. A past case has the data for the full time span of the crisis. First, tipping points and factors should be found for this case. This can be done similarly to this research. Based on the found factors, as much data as possible has to be collected. These variables can first be analyzed individually to see whether thresholds can be set based on these individual variables. If this is the case, this shows how every creeping crisis might have to be dealt with and monitored differently. However, if the outcome is similar to the outcome from this research, a PCA should be conducted, to see whether the variables can easily be combined. Next, similarly to this research, the outcomes of the PCA should be tried to match with the found tipping points.

It might be that, when trying the approach on a different case, completely different conclusions are found. In that case, it should be concluded that the approach that makes use of thresholds does not work on multiple types of creeping crises and a different approach should be found and tested. However, if a similar conclusion is found - a PCA shows a trend that is similar to the time line of the crisis -, the results of this PCA can be further worked out to make the approach suitable in practice. It might be that in both cases the tipping point can be found around the same values of one of the found component. For example, in this research the first tipping point is found when one of the components has the value 0.5. If a similar value is found in a different case, this finding can be further worked on. This might result in a situation where a tipping point might be reached when one of the components reaches a certain value.
Another way to put the findings of the PCA to practice is by trying to attach meaning to the meaningless values of the found components that are the result of the PCA. It might be that on two different moments in time a component takes a similar value. If these two different moments in time show a similar state of the threat, this finding can be further pursued. Once the components have received some meaning, this meaning could be used to set thresholds.

Once the approach has been tested on past cases it can be tested on current creeping crises that

seem to be in their creeping phase. This means it is most likely for the research to last some time as the threat builds up. Besides, the research might end up to be all for nothing as the creeping phase does not turn into the hot phase but in the cold phase. When studying a developing creeping crisis, the issue of incomplete data has to be dealt with. This thesis has used normalization in order to be able to perform a Principal Component Analysis. However, the full range of values of a variable is unknown when the time span of the crisis has not been finished. A way to deal with this issue might be by recalculating the components every time new data is available. This will make it more difficult, however, to attach meaning to the found components as the components might change when a new data point is added. In a creeping crisis that is at the time of research still in a creeping phase it can be tested whether the continuously recalculated components might show a threshold being reached when a set value is arrived at.

Scenarios

The approach that makes use of scenarios was deemed not suitable for detecting the tipping point of a creeping crisis when the creeping phase turns into the hot phase. As the creeping crisis can be found in the realm of the (un)known unknowns, the threat is complex and the incubation period long, there are many possible ways the creeping phase might end. Not enough scenarios can be made to take every possible potential future into account. However, as Luesink, Wolbers et al. (2024) show, the use of scenario planning can help safety regions when it comes to sense-making of the crisis situation they are in. Looking at this aspect, scenarios might be used *in addition* to the use of thresholds. Research can be conducted to understand whether and how scenarios can help the safety regions. When the approach of thresholds finds that a tipping point is (nearly) reached, scenarios might help the safety regions be more prepared for what is to come.

When conducting this research, a choice first needs to be made whether to study all the different types of scenario planning that Luesink, Wolbers et al. (2024) identify as being used by different safety regions or only one. When studying all types of scenarios it can be seen whether all these approaches are useful. However, studying only one in-dept can also be a good starting point. Once a choice is made for one or multiple approaches of scenario planning, a case - or multiple - need to be selected to test the approach on. Here, a choice can be made to test the approach(es) on a past case or a present case. Here the subjectivity of the goal of the approach should be taken into account. The goal of the use of scenario planning is to help with sense-making and therefore to help safety regions make better informed choices in crisis situations. This is much more subjective than the detection of tipping points with the use of thresholds.

In a real time case it can be tested whether the scenario planning makes the crisis responders feel like they are helped. However, this approach comes with risks. Firstly, there is a danger of hindering responders with an approach that in hindsight might have worked counter-productive. In a crisis situation this can be crucial. The other risk can be found in the fact that tipping points of a creeping crisis do not happen every day. Not every day a creeping phase ends to turn into a hot phase. This means that the research might have to wait a few months or even a few years.

When making use of a past case, the subjectivity can be tested less compared to a real time case. The focus of the use of a past case should be on the question 'would this work?' and not on whether it could help. This research looks more to whether the use of the approach is possible, in a similar way as this thesis does. Subjectivity can still be part of this research. When studying a past case, crisis responders that were in charge of dealing with the crisis can be interviewed. In these interviews a story can be given to them of what scenarios they would have had and how this might have affected their decision-making. After discussing this, they can be asked whether they think the approach would have helped them or would have hindered them.

Patterns

The idea of the approach of patterns came from a round table discussion during a crisis detection conference. The initial idea of this approach looked at a different tipping point of a creeping crisis: the moment the cold phase turns into the creeping phase. This is an interesting moment as this seems as a tipping point that an actor like the safety regions would not care about. However, this moment is the start when things can be monitored and actions can be prepared. Especially in cases such as the COVID-19 pandemic where the incubation period was only a matter of month - compared to the refugee

crisis where it could be argued that there was an incubation period of years - having as much time as possible for monitoring and preparing is important. It is recommended that research is conducted to see whether an algorithm could be created to detect the tipping point where the creeping phase starts.

When choosing an approach in chapter 5 it was found that the interpretability of the findings of the approach could be a big issue. If an algorithm 'says' a patterns has changed, this first needs to be interpreted correctly before action can be taken. In itself, a pattern changing might not mean anything. When it comes to the tipping point at the end of the creeping phase, this interpretability issue has implications. If the hot phase has started there is no time to spend on difficult interpretation questions. However, when it comes to the tipping point at the start of the creeping phase, these implications are not as big. There is more time to understand what the algorithm 'means', what it is 'saying'.

The research to come to this approach that makes use of patterns is similar to the research conducted in this thesis: a case needs to be chosen to make and test the approach on. Another option can be to make use of multiple cases to see whether there are similarities in patterns when it comes to the start of the creeping phase.

One of the difficulties of this approach is the ethical implications of the use of algorithms by an emergency service actor. Can important decisions be made based on an algorithm? How is the data collected and used by the algorithm? These questions are broader than the recommended research. These questions, and more, are also raised when AI could be used in the emergency control room. They are questions to not take lightly. As a public organization, made decisions need be able to be explained. The use of algorithms or AI make this more difficult.
Another difficulty of this approach is the need for much data. Training algorithms require a lot of data. Safety regions are limited in this as their VIKs do not own all of the data that is collected there. Most of the data in the VIK comes from third parties. Therefore, when deciding what data is necessary for the creation of an algorithm, this needs to be taken into account. Not all data is accessible or available.
Tied to this is a question of expertise. The approach needs expertise to build an algorithm and to be able to understand the workings and the outcomes of it. It can be questioned whether the safety regions individually have this expertise. However, on a more national level this might be better manageable. This, and the other difficulties need to be taken into account when conducting research on the approach of patterns.

7

Conclusion

The aim of this thesis is to find an answer to the research question. In order to do so, four sub-questions have been formulated. The research question and the sub-question are as follows:

What detection approach could help the Dutch safety regions in detecting the tipping point of a creeping crisis when the creeping phase becomes the hot phase?

1. *What is the definition of a creeping crisis for the Dutch safety regions?*
2. *How do the complexities of a creeping crisis affect the detection of the tipping point when the creeping phase turns into the hot phase?*
3. *What approaches can be used by the Dutch safety regions to detect this tipping point of a creeping crisis?*
4. *How can this tipping point of a creeping crisis be detected?*

In order to find an answer to these questions interviews are conducted, literature is studied, a case study is executed and data is analyzed. This chapter draws a conclusion based on these methodologies. First the four sub-questions are answered one by one. Finally, the main research question is answered.

7.1. The Definition

What is the definition of a creeping crisis for the Dutch safety regions?

Boin et al. (2020) have found an often used definition of a creeping crisis. However, this definition uses a strategic or governance perspective. To take the tactical perspective of the safety regions into account a description of a creeping crisis is formulated. This description does not replace the definition found by Boin et al. (2020), it adds a different perspective.

The main difference between a creeping crisis and a 'regular', 'flash' crisis is the addition of an extra phase. A flash crisis only has a cold phase - when no crisis is happening - and a hot phase, when the crisis *is* happening. The creeping crisis adds a creeping phase between these two phases. In this creeping phase the threat of the crisis builds up. A creeping crisis has a number of characteristics. First, the creeping crisis is a threat to one or more vital interests of society. Second, the threat has a long incubation period. This means that there is a long creeping phase during which the threat builds up. Third, it is unclear whether the threat asks for an acute response. Fourth, there is no clear time pressure. During the creeping phase there is no time pressure to reduce the threat. Fifth, the threat of a creeping crisis is complex. The threat is made up out of different components that all interact with one another. Sixth, the threat can be found in the realm of the known unknowns or the unknown unknowns. The threat has not been seen before and might not have been imaginable beforehand. Seventh, at the end of the incubation period the buildup might not lead to a precipitating event and the threat dies down. There is a possibility the creeping phase never transitions into a hot phase. Whether or not this happens is unknown during the creeping phase. Eighth, when the threat does not die down, the precipitating event might not be clear or might not happen et all. The transition from the creeping phase

to the hot phase might not be obvious with clear signs of the hot phase starting. Lastly, the creeping crisis is a wicked problem. The threat cannot easily be defined, it is not clear what the problem exactly is and how to solve it.

Most of these characteristics influence other characteristics or are influenced by others. There are three types of characteristics: about the nature of the threat, about the creeping phase and about the tipping point when the creeping phase ends. The keyword to these characteristic is 'uncertainty': things are unknown or uncertain. This leads to the following description:

A creeping crisis is a threat to one or more vital interests of society for which there is uncertainty about the nature of the threat, about the buildup of the threat and about the end of this buildup.

This description fits the safety regions as it takes their tactical perspective into account. It is not focused on solving the threat before the hot phase starts. It looks specifically at the threat itself and not at all its implications.

7.2. Complexities and Detection

How do the complexities of a creeping crisis affect the detection of the tipping point when the creeping phase turns into the hot phase?

The found description points out an important complexity of a creeping crisis: uncertainty. The uncertainty around the nature of the threat makes it very difficult to decide what to focus on, to demarcate the problem. The different aspects of the threat interact and enhance each other. What the crisis actually is or how it will manifest itself is unknown. When trying to detect the tipping point this makes it difficult to decide what to focus on. This is necessary, however, as it is impossible to pay attention to every aspect of this complex creeping crisis. The danger is that an aspect of the threat that has not been focused on turns out to develop into a hot phase.

The uncertainty about the buildup of the threat makes the detection of a change in situation difficult. A regular crisis has no uncertainty around the buildup: it builds up very quickly and visibly. The uncertainty around this makes it difficult to notice a change in threat. Besides, when specifically trying to detect the tipping point, it would be the easiest if the moment could be compared to the 'regular' situation. The tipping point would then be the moment the situation is no longer 'normal'. However, through the buildup, the creeping phase, it becomes unclear what this 'normal' actually is. Especially since a creeping phase can span years.

The uncertainty about the end of the buildup points at the tipping point itself. It is uncertain beforehand what the end of the creeping phase will look like. It could be a tipping point that ends the creeping phase and starts the cold phase. However, it could also be a tipping point that ends the creeping phase and starts the hot phase. This makes the detection of this tipping point tricky as it is unknown whether this tipping point will happen in the first place. Besides, this tipping point might not be an obvious moment. Chances are the tipping point will happen quietly, making it difficult to spot it.

7.3. Approaches for Detection

What approaches can be used by the Dutch safety regions to detect this tipping point of a creeping crisis?

Four different approaches are found that could help detect the tipping point, when the creeping phase ends and the hot phase begins, of a creeping crisis. The first approach focuses on the continuity of the organization of the safety regions. Here, the tipping point would be the moment the organization can no longer function normally and is impacted by the creeping crisis. This approach deals with the complexities of a creeping crisis by reducing the size of the crisis. The threat is reduced to the impact it has on the organization. It is, however, not very easy to understand and use this approach. Besides, it is not a robust approach.

The second approach that looks at thresholds is more promising. Thresholds are set up for different variables. Once one or more of these thresholds are reached, it is a sign a tipping point might be reached. It affects the uncertainty of the tipping point directly. Through its intuitiveness it is very understandable and usable. Whether it is robust is an uncertainty.

The third approach is less promising than the second approach. It sets up scenarios beforehand. Once a scenario has become reality, this is a sign a tipping point is reached. Through its positive effect on the uncertainty around the nature of the threat, as scenarios help with making sense of what is happening, it affects the uncertainty around the tipping point. Just with the previous approach it is understandable and usable. However, it is not very robust.

The last approach looks at patterns. The concept of this approach is that before the tipping point data about the threat follows certain patterns. The tipping point is the moment these patterns start to deviate. This approach directly affects the uncertainty of the tipping point as it looks at the variables that create this tipping point. However, this approach is not understandable or usable for the employees of a safety region. However, it is very robust.

7.4. Detection of Tipping Points

How can this tipping point of a creeping crisis be detected?

The approach that makes use of thresholds can help with the detection of tipping points. However, it is not as straightforward as the way the approach was presented. The approach has been presented as a clear traffic light system with thresholds for each factor that makes the lights change. However, the different variables all tell their own, separate story. The case the approach has been tested on, the refugee crisis, has two different tipping points that are less than a year apart. For each variable it is impossible to come to a threshold that would point out these two tipping points. For some variables a threshold only points out one tipping point and for other variables a threshold points out more than these two tipping points.

Conducting a Principal Component Analysis reduces the amount of variables, this makes it easier to see the situation in one picture. A PCA still maintains as much original information as possible. These outcomes show that it seems the approach of thresholds *can* be used to help detect a tipping point. But, not in the way the approach is used now by different safety regions. Now, it is used as a straightforward traffic light system with thresholds for each individual factor. Based on the used case and available data chapter 5 shows this straightforwardness does not seem to work through the complexity of the creeping crisis. However, when combining variables through a PCA, it might be possible to set thresholds for these found components and detect a tipping point this way. It can also be concluded, given the used data, that a percentage change of the variables does not seem to play a role when it comes to the tipping points.

7.5. Research Question

What detection approach could help the Dutch safety regions in detecting the tipping point of a creeping crisis when the creeping phase becomes the hot phase?

The Dutch safety regions start their crisis response when the hot phase of a crisis starts. A creeping crisis comes with a lot of uncertainty. This uncertainty is about the nature of the threat that is developing, about the building up of the threat during a creeping phase and about the end of the creeping phase. The fact that it is unknown beforehand whether the creeping phase will turn into the hot phase and how this would manifest itself, asks for an approach to detect this tipping point. This thesis looked into an approach to make use of.
To conclude, an approach that looks at thresholds could be an approach that could help the Dutch safety regions in detecting the tipping point of a creeping crisis when the creeping phase becomes the hot phase. This way the safety regions can work on a safer society as a timely detection helps the safety regions with a timely, suitable response. This approach sets thresholds. Once a threshold is reached, this is a sign of a tipping point being reached. This approach takes the uncertainty surrounding the tipping point into account and tries to reduce it. However, it is difficult to decide what factors of the threat to take into account when setting thresholds. Through the interacting factors of the threat, setting thresholds for individual factors does not seem to work. However, combining the factors with a Principal Component Analysis seems promising. When thresholds could be set for the found components through a PCA, tipping points might be detected.

These findings show that an approach could be developed for the Dutch safety regions to detect the

tipping point of a creeping crisis. For this, some more research needs to be done on the way to apply the approach of thresholds in practice. However, the findings are promising. When it comes to the scientific relevance of this research, the findings show how conceptualization and operationalization can be used for empirical grounding. Within the research on creeping crises the focus has been on conceptualization. This research has taken a first step towards the use of conceptualization for operationalization and empirical grounding.

8

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A

GRIP structure

In times of crisis, the safety regions have a system to deal with this. This is the GRIP (Gecoordineerde Regionale Incidentbestrijdings Procedure/ coordinated regional incident response procedure) structure. This structure is the same for each safety region and provides a structure for multidisciplinary coordination (Brandweer, 2022). The structure has four levels that can be activated when needed. With most incidents no GRIP level is activated.

A.1. GRIP 1

GRIP 1 is the lowest level of GRIP and is activated when multidisciplinary coordination is necessary (Brandweer, 2022). This coordination is needed when the police, ambulance services and the fire department are all involved in an incident and need to work together. When this level is activated, a CoPI-unit is placed on site where the incident is happening. CoPI stands for Commando Plaats Incident (Command Place of Incident). This unit is a portable command center. The leaders from the different disciplines present use this command center to meet and coordinate their response.

There is a set list of people that have a place in the CoPI: a leader-CoPI, the officers in charge of the police, the ambulance service, the fire department and residents' care (Veiligheidsregio Utrecht, 2024). Besides these officers, an information manager and an communications advisor are present as well. In specific types of incidents other people can also be asked to join the CoPI. For example, in case of a railway related incident someone from ProRail might have to join as well.

The meetings in the CoPI are on an operational level (Luesink, Bakker et al., 2024). In these meetings the situation is discussed and actions are coordinated. At the end of every meeting the officers go back into the field and direct their own people.

A.2. GRIP 2

When an incident is bigger than the area in which it is happening, the activation of GRIP 2 might be necessary. This might be the case with big fires where there is a CoPI-unit on site. However, when the smoke coming from this fire becomes a problem for surrounding neighborhoods, the people in the CoPI have no time to deal with this as well, they need all there time and energy to deal with the incident at hand. Two different types of areas become visible: the incident area and the affected area. GRIP 2 introduces a Regional Operational Team (ROT) that deals with the (potential) effects of the incident.

This ROT exists besides the CoPI. The leader-CoPI might be an advisor to the ROT (Luesink, Bakker et al., 2024). The ROT contains the Regional Operational Leader (ROL/OL), commanders of the different disciplines, an information manager and a crisis communication advisor (Veiligheidsregio Utrecht, 2024). The meeting of the ROT are on a tactical level (Luesink, Bakker et al., 2024).

A.3. GRIP 3

Incidents with bigger societal implications might need consultation with the mayor of a municipality (Brandweer, 2022). When this is necessary, this mayor decides to activate GRIP 3. This level introduces a Municipal Policy Team (GBT / Gemeentelijk BeleidsTeam) besides the CoPI and the ROT. This team advices the mayor about measures to take and about communication towards the press and public. The meetings of the GBT are on a strategic level (Luesink, Bakker et al., 2024).

A.4. GRIP 4

For incidents of GRIP 3 level that span multiple municipalities GRIP 4 is activated (Brandweer, 2022). The chair of the safety region (the mayor of the biggest municipality of the region) becomes the chair of the RBT (Regional policy team/ Regionaal BeleidsTeam) (Brandweer, 2022). This RBT advice the chair of the safety region. Within the RBT are the mayors of the affected municipalities, the chief public prosecutor and the chair of the water authority (Brandweer, 2022). Often other advisors also join the RBT (Veiligheidsregio Utrecht, 2024). The meetings of the RBT are on a strategic level (Luesink, Bakker et al., 2024).

B

Informed consent

The respondents who were interview about the case of the refugee crisis where asked for their informed consent. Before the interview took place they were send an informed consent form. This form can be found at the end of this appendix. Besides, before the interview started all respondents were asked whether they consented to being recorded. After the interview, the interviews were summarized as can be seen in appendix C. These summaries were send to the respondents for them to check whether the summaries fitted their perspective. Five out of seven respondents signed the consent form, the other two respondents gave their verbal consent at the start of the interview. Six out of seven respondents were send the summary of their interview. One respondent could no longer be reached as they no longer work for the organization they worked at the time of the interview.

B.1. Informed consent form

U wordt uitgenodigd om deel te nemen aan een onderzoek over omslagpunten binnen sluimerende crises. Dit onderzoek wordt uitgevoerd door Marte Treurniet, masterstudent Engineering and Policy Analysis aan de TU Delft. Dit afstudeeronderzoek wordt uitgevoerd in samenwerking met Veiligheidsregio Zuid-Holland Zuid.

Het doel van dit onderzoek is om een beter beeld te krijgen van de loop van een sluimerende crisis en het overgangspunt waar de sluimerende fase overgaat in de acute fase en zal ongeveer 60 minuten in beslag nemen. De data zal gebruikt worden voor het afstudeerverslag wat gepresenteerd en gepubliceerd zal worden. U wordt gevraagd om vragen te beantwoorden over het begin van de vluchtelingencrisis van de zomer van 2022 als sluimerende crisis. Hierbij gaat het alleen om uw professionele mening over de loop van deze crisis en niet uw persoonlijke kijk hierop.

Zoals bij elke online activiteit is het risico van een databreuk aanwezig. Wij doen ons best om uw antwoorden vertrouwelijk te houden. We minimaliseren de risico's door de opnames van het interview en de transcriptie zo snel mogelijk op een beveiligde OneDrive van de TU Delft op te slaan. De antwoorden worden geanonimiseerd, samengevat en ook bewaard in deze OneDrive. Het ondertekende toestemmingsformulier bevat naam en e-mailadres en wordt ook bewaard op de OneDrive. Er bestaat altijd het risico van re-identificatie. Door de antwoorden te anonimiseren en samen te vatten wordt dit risico zo veel mogelijk geminimaliseerd.

Uw deelname aan dit onderzoek is volledig vrijwillig, en u kunt zich elk moment terugtrekken zonder reden op te geven. U bent vrij om vragen niet te beantwoorden. De samengevatte antwoorden zullen worden verwerkt in het afstudeerverslag. Dit verslag zal publiek toegankelijk zijn. Voor dit verslag wordt gepubliceerd zal worden gecontroleerd of de verwerking van de antwoorden overeenkomt de bedoeling van de respondent.

De in dit interview verzamelde data zal tot twee jaar worden bewaard onder de verantwoordelijkheid van Haiko van der Voort. De data kan worden hergebruikt voor toekomstige wetenschappelijke publicaties of voor lesmateriaal over crisismanagement. Als de data voor deze doeleinden wordt hergebruikt, zal

dit volledig anoniem zijn.

Ik heb de bovenstaande informatie over het onderzoek gelezen en begrepen en ik stem toe met mijn deelname aan het interview en met de verwerking van de data zoals hierboven beschreven staat.

Naam respondent: Handtekening respondent:

Marte Treurniet

Afstudeerbegeleider: Haiko van der Voort

C

Summaries of interviews

C.1. Safety Region Groningen

Two respondents work for the safety region Groningen.

C.1.1. Respondent 1

The respondent works for the safety region Groningen. During the refugee crisis their job was to bring together the different parties involved in order to make sure every party had the same information. These were parties like COA, IND, avim (police) and the municipalities. Once the crisis escalated, the red cross and doctors without borders, for example, also got involved.

During the COVID-19 pandemic the mayors from the municipalities within the safety regions got together periodically as is usual in a GRIP 4 situation. Because of this, the mayors were in contact with each other often. Through this contact, the mayor of Westerwolde was able to share information about the situation in Ter Apel. Because of this, a decision was made to deal with the issues regionally. Just looking at the facts it could be argued that it was 'just' a public order and safety issue in *one* municipality. However, the municipalities in Groningen decided to help each other.

On October 20th 2021 a decision was made to call GRIP 2. And when the GHOR pronounced the situation as inhumane GRIP 2 turned into GRIP 4. Besides this, a baby died in Ter Apel, which also was a strong trigger to take the matter very seriously.

The respondent argues that even though the safety region treated it as a regional crisis by using the GRIP structure, it should have been treated as a national crisis earlier on as it was not a regional problem. The issue called for national alignment instead of only regional alignment in one region. Besides, it was odd that practically a fourth level of government was created (besides the national, provincial and municipal level) through decision-making by the safety region.

The respondent saw a lack of response from other safety regions, especially since it should have been seen as a national problem. This lack of response became even more clear when, with the invasion of Russia in Ukraine, the safety regions and municipalities seemed eager to help accommodate those refugees. This lack of response made the respondent feel lonely.

When it comes to indicators that can be used to understand the 'state' of the crisis, the respondent sees health as an important indicator. Tied to this is the stability of the housing situation of the refugees. If a refugee has to constantly move location it is not stable and this might affect their health. The respondent sees that the moving of refugees happened a lot by COA on last-minute notice to avoid people having to sleep outside.

C.1.2. Respondent 2

The respondent works for the safety region Groningen. During the refugee crisis their job was to bring the different parties together and lead these meetings. This job could also be seen as the bridge

between the operational side and the board. The respondent mostly remembers the time of about a year when the situation was seen as a GRIP 4 situation. They recall the decision to go to GRIP 4 was mostly made to have more tools to help the municipality of Westerwolde and also as a sign towards 'the Hague' that they had to do something as things were getting out of hand.

The safety regions can be seen as a great tool to unite municipalities and quickly bring together different parties. However, this tool can also be misused. There are two ways to look at the situation. The first way is that the safety regions could help out where they can and can serve as a useful tool that can create crisis emergency accommodation. The second way is that the situation is not a crisis at all. Part of this view is also that the situation is created by a decade of political decisions. It just so happens that all these political decisions eventually come together in Ter Apel as this is the only registration location in the Netherlands. The respondent sees the situation as a 'perfect storm': the amount of people with a residence permit who cannot get a home because of a housing crisis and a nitrogen crisis, years of budget cuts and a decreasing willingness from municipalities to organize accommodation. This resulted in hundreds of people sleeping outside and Doctors without Borders stepping in for the first time in the Netherlands.

As mentioned before, GRIP 4 was first used to provide the safety region with the tools they needed to help out the municipality of Westerwolde. GRIP 4 allowed the safety region to set up a lot of crisis emergency accommodation locations, as accommodation was initially the first priority as COA was not able to have enough capacity. Besides, the safety region was a great tool to bring together the municipalities within the region. However, it seemed as the more the safety region was doing the more the national government relaxed, so a later task of the safety region was to put pressure on the national government.

Whether or not the situation could be seen as a crisis for the safety region, it did eventually become a humanitarian crisis. The GHOR had a job in taking care of the health care side of the issue. The region of Groningen does not have too many GP's. Therefore, the GHOR was needed to coordinate the care for the refugees. The Red Cross became involved as well. However, their job did not involve health care. The organization helped out with arranging locations.

The activation of the national crisis structure did not help the region of Groningen according to the respondent. Even though the structure did provide the national government with tools, municipalities still needed to be persuaded to help out.

C.2. COA

Two respondents work for COA. They were present at the same interview.

C.2.1. Respondents 3 and 4

The respondents work for COA. COA has for years been an organization that changes its capacity based on the predicted inflow of refugees. For some years they were not allowed to have a reserve capacity. After 2015 till 2018 the capacity has been lowered for a few years. In 2019 a prediction was made for a higher inflow of refugees. This meant the capacity had to be increased. This changing capacity made municipalities more unwilling to cooperate. While in the middle of conversations with municipalities, the COVID-19 pandemic hit. This meant the location in Ter Apel was closed and travel restrictions came in place. This resulted in a standstill when it comes to inflow of refugees. The plans to increase the capacity were put aside. During the pandemic, scenarios were made to try to predict what would happen after the pandemic when the travel restrictions would be lifted. These predictions and scenarios were difficult to explain to other organizations as everyone's concern lay with dealing with the pandemic. At the time the restrictions were lifted, during the summer of 2021, the inflow increased. Around the same time the American army left Afghanistan and many people tried to flee Kabul.

To deal with this high inflow, old military bases were transformed into accommodation. But the 21st of October the safety region Groningen asked for help. In the same month the state secretary was told that COA was not going to have enough capacity. A decision had been made before that COA would have to give the ministry a warning when the prediction would be that in three weeks' time the occupancy rate would be higher than 93%. In October of 2021 this was the prediction. The reaction to that was to transform more military bases. In December 2021 the state secretary gave an instruction

to multiple municipalities to provide accommodation within a short period of time. In hindsight it turned out this instruction should not have been given as judicially it was not correct.

During the winter the situation calmed down again. However, when Russia invaded Ukraine in February 2022 Ukrainian refugees entered the Netherlands. At first it was de job of COA to provide these refugees with accommodation. COA took care of five locations. However, for COA this job was impossible to take on besides their regular work. Ter Apel was already crowded and providing even more refugees with shelter was not doable. The Ukrainian refugees were given a different status compared to the other refugees. This meant providing them with accommodation became the job of the municipalities. This still reduced room for COA to find more capacity, as this room had to be shared with the municipalities.

In the spring of 2022 tents were placed in Ter Apel to give shelter to every refugee for whom there was no room in the regular buildings. Eventually, in June of 2022 the national crisis structure was activated. Two separate problems were distilled: finding accommodation and housing people who have received a residence permit. People who had received a permit would have to move out of their accommodation to their own house. However, not all these people were able to receive housing straight away and therefore stayed within the accommodation system, keeping spots occupied. Besides, not enough accommodation locations made it very difficult to provide refugees coming into the country with a place to stay and wait to hear the decision made concerning a permit.

When activating the national crisis structure the safety regions stepped in to provide more accommodation. This activation helped to reduce the problem of finding accommodation. However, it did not greatly help with the housing problem of people with a permit.

Even though the activation of the national crisis structure is officially the start of the crisis, the respondents point out the months before this moment were already very challenging for COA. However, given that the term ‘crisis’ has legal implications it is difficult for an executive organization.

When talking about warning signs the respondents mention the occupancy rate as a sign. After the activation of the crisis structure refugees had to sleep outside as there was not enough room in Ter Apel. This situation also is a clear sign that the situation is heading in the wrong direction.

C.3. Safety region

One respondent is the director of a safety region. This is not safety region Groningen.

C.3.1. Respondent 5

The respondent is the director of one of the safety regions. The safety regions all had to step in once the national crisis structure was activated. Before this moment the safety region Groningen had already asked the other safety regions to help out. The respondent argues that it was not supposed to be the job of the safety regions to help in this issue. It is a problem created by political choices and should not be solved by an organization that has nothing to do with the issue. This is because juridically speaking it was the job for other organizations. The problem can be seen as two issues: the accommodation of refugees and the housing of people that have received a residence permit. These are mainly issues for COA and municipalities, the safety regions have nothing to do with it.

The respondent sees the activation of the national crisis structure as a way of using instruments that cannot be used without this activation. The safety regions can be seen as one of these instruments. Calling the problem a crisis makes sense as it is a terribly complicated issue. It can be seen as a wicked problem. The safety regions are a useful ‘instrument’ to use for these wicked problems as these organizations are great at getting things done quickly. However, it is a bold choice to let the safety regions fix something political choices have created. Besides, there is a distinction between crisis emergency accommodation and emergency accommodation. The safety regions can create crisis emergency accommodation. An example of this type of accommodation could be the use of a sports hall for a few days. This type of accommodation is not suitable for a longer period of time. In the long-term crisis emergency accommodation becomes emergency accommodation. The safety regions have no experience with this type of accommodation.

Besides the matter of type of accommodation, there are more reasons for safety regions not to be

involved. This is about the acuteness of the crisis. Another reason can be found in the needs of the refugees. This can be seen in the difference between Ukrainian refugees and the refugees who enter Ter Apel. Initially, Ukrainian refugees were not planning on staying in the Netherlands and would return to their country once the war was over. This means the priority lies on housing and health care and not on education and the organization of activities. The respondent sees that the latter issues, the well-being questions, would ask too much of the safety regions. Regardless of the reasons to not get involved, the regions did create accommodation. For this they received millions of euros from the national government for taking on responsibilities. This is tricky as it creates some expectation that the safety regions can be used as instrument for crises like these more often.

It is very understandable the situation was seen as a crisis within the safety region Groningen as for them the issue was about health and public order and safety. With that, it was also understandable that the chairs and directors of other regions were asked to jump in. The other regions had to make a decision whether to help. The respondent saw this as a decision they could be persuaded to. However, it is important to make sure you do not end up doing a job that does not suit you. Here the two different roles of the director seem to play a role as well: the director leads the organization *and* is the secretary of the board that is made up of all mayors within the region.

As director, the respondent was in principle against the involvement of the safety regions. As the secretary of the board, the mayors might ask something different. To the respondent it seemed sometimes the mayors wanted the safety regions to become involved and create crisis emergency accommodation. This way they could postpone the question about the housing of people with a residence permit. However, the involvement of the safety region could make sense in regions with less municipalities as it could be seen as a way for the municipalities to work together.

There are reasons for safety regions to want to get involved and reasons not to. There have been discussions between the directors of the safety regions on this. Whether a safety region wants to get involved can almost be attributed to a director's personal opinion on the issue.

C.4. Municipality

Two respondents work for the same municipality. This is not a municipality in the province of Groningen.

C.4.1. Respondent 6

The respondent works for a municipality at a department that concerns itself with issues of public order and safety. In December 2021, the state secretary gave multiple municipalities the instruction to accommodate refugees within a matter of weeks as it seemed Ter Apel would overflow if no help was offered. The municipality of the respondent was one of the few municipalities that received these instructions. Within this municipality there had been an accommodation location before and this building was not in use at the time. Within two weeks this building was made ready to house 300 refugees for four weeks. However, most people did not seem to believe the location would close again after this time. There was an understanding the location would be used for a longer period of time. Indeed, this turned out to be the case. The location has existed during the whole of the refugee crisis and has stuck to the amount of 300 residents.

The instruction from the state secretary did not come out of nowhere. On an administrative level there had already been conversations. This, combined with the fact there was already an old location in the municipality and the pressure on Ter Apel was obvious, made rumors go around that an instruction would soon follow. Before the instruction was received conversations were held within the municipality to offer the location voluntarily. However, before this could be decided the instruction was given. This instruction did not necessarily feel like the start of a crisis to the respondent. It could be seen as a crisis as all other, regular work needed to be dropped. However, as the instruction was responded to rationally (there is nothing we can do about it anyway) and adequately, the situation did not feel like a crisis situation to the respondent.

The job of the respondent was to ensure the safety around the location. This meant contact needed to be made and kept between the respondent, the police and the location manager from COA. Agreements needed to be made with COA to make sure the municipality and COA could smoothly work together. Besides, conversations were held between the respondent and local residents. These residents were

unhappy with the location of the accommodation as a promise had been made when the location had been closed before that it would never be used again as accommodation for refugees. This promised was a reason for resistance from the local residents. A lot of effort needed to be made to reassure these residents.

Before the arrival of the refugees a condition was set that the group should mainly be families and woman but no single men. This, to avoid complete resistance from local residents. An effort was made to slowly reduce this resistance further by conversations with residents and by dealing with arising issues adequately.

The initiation of the national crisis structure half a year after the instruction was not greatly felt by the respondent. The municipality had already done its share in accommodating refugees. It was a matter of sticking to this number and making sure that other municipalities who were not doing their share would first do more before even considering doing more themselves.

C.4.2. Respondent 7

The respondent works for a municipality at a department that concerns itself with refugee accommodation and integration. In December 2021 the state secretary gave multiple municipalities the instruction to accommodate 300 refugees within a matter of weeks as it seemed Ter Apel would overflow if no help was offered. The municipality of the respondent was one of the few municipalities that received these instructions. Within this municipality there had been an accommodation location before and this building was not in use at the time. Before the instruction was given the municipality was already looking for a location to use as they wanted to help COA and the municipality of Westerwolde. A check was made to see if the old location could be used. A decision was made not to do this as a promise had been made to the local residence that the location would not be used again as an accommodation location. Conversations were held with the province and COA and it was decided to create a location for 150 people on a boat. This boat would be used until a better location was found. The process of informing residents and asking for a permit from the province was started.

Before this process could be finished the instruction from the state secretary was given a few weeks before Christmas 2021. This instruction came unexpectedly and caused great confusion with the municipality. COA had known the municipality was in the middle of the process to create a location. Without the instruction a location would be created anyway, only a bit smaller and a bit later. The instruction meant that the old location had to be used again and the efforts to create a location on a boat were no longer necessary. Besides, the instruction and the use of the old location caused great anger among local residents. These residents did not understand why the location had to be used again. They did not believe the municipality had no idea an instruction was coming. The fact that one level of government did not know what another level of government was about to do was unbelievable.

Later in time the state secretary and the director of COA came to the municipality to apologize for the fact that the instruction was given even though a process was already gone through to create accommodation. The chair of the safety region, who was not the mayor of the municipality itself, also stepped up and defended the municipality and expressed their disappointment with the instruction. To regain the residents' trust, meetings were organized and a promise was made that the location would only be used for a year. During this year the municipality could use the time to find another location. Once the location was in use there were only a few smaller issues with residents that could easily be solved.

The issues in Ter Apel and the pressure on the whole accommodation chain was noticeable through the fact that the location for 300 refugees was full. However, besides this pressure, the municipality was not able to do more than they were already doing. There were no other locations and the municipality did not want to still make use of a boat as well, given the way the instruction had been given. Now, it was the turn of other municipalities. The pressure *did* translate to a pressure to find a different location within a year. The situation in Ter Apel showed the national crisis would not be solved before this so effort should be made to avoid the current location being needed after a year.

The months before and after the instruction had felt like a crisis situation. This was because of the anger of the local residents and because of the pressure felt that something had to be done quickly to help out Ter Apel.

The location was constantly occupied, most people stayed there for a longer period of time and only left the location once they received a residence permit and a house. The municipality was able to fulfill their task of providing housing for people with a permit.

The situation did not only affect the relation between the municipality and its residents and the municipality and COA it also affected the relationship between the municipality and the municipal council. The council became very critical. The municipality tried to be as transparent as possible to prevent the college of mayor and Aldermen to fall, like the way this had happened in a different municipality.