Preface

This master thesis is original, unpublished, independent work by the author, R. Groot. It is part of the master Crisis & Security Management of Leiden University, Faculty of Governance and Global Affairs. As part of the capstone ‘System Safety Management and High Reliability Organizations’ this thesis was supervised by Dr. J. Reijling. I would like to thank him for the supervision and helping me getting a research placement at Eindhoven Air Base of the Royal Netherlands Air Force. Furthermore I would like to thank Colonel J. van Soest, commander of Eindhoven Air Base, for agreeing with the research proposal and granting me access to the air base. Finally I'd like to give special thanks to Captain F. Steevens for helping me with practical issues at the air base.

Rob Groot

The Hague, June 2016.
Summary

This research looks into the topic of ‘resilient performance’ and ‘managing the unexpected’ by ‘High Reliability Organizations’ (HROs). HROs are mindful organizations that successfully avoid disasters in an environment where incidents are likely to happen because of complex systems and the involvement of risk factors (K. Weick & K. Sutcliffe, 2007). Airport Eindhoven is an organization where complexity and risks are part of daily operations. It is the second biggest airport of the Netherlands with over 42,000 flights (Rijksoverheid, 2015), of which 30,000 are civil flights by Eindhoven Airport (EA). Whereas most flights are civil, the airport is operated by the Royal Netherlands Air Force under the name of Eindhoven Air Base. This is the home base for transport airplanes for military operations worldwide. Despite preventive safety measures the chances of airplane incidents and crashes always exists. Therefore airport Eindhoven has a Crisis Response Organization (CRO) consisting of manpower, response plans and material, which can be deployed in case of emergencies. This organization is a multidisciplinary cooperation between military and civil organizations. Merely the presence of a CRO does not mean the airport is invulnerable to incidents or crises. The problems of human fallibility, the nature of unexpected events and the fallacy of predetermination tell us that organizations should invest time and resources to create mindful practices in order to deal with these problems. HROs have successfully done that. This led to the following research question:

“To what extent can the Crisis Response Organization of airport Eindhoven be characterized as a High Reliability Organization, and how can discrepancies be explained?”. 

Weick & Sutcliffe (2007) studied HROs (e.g. aircraft carriers and nuclear power plants) and created five principles that should be respected in order to create a mindful structure in an organization. The five principles are (1) preoccupation with failure, (2) reluctance to simplify, (3) sensitivity to operations, (4) commitment to resilience and (5) deference to expertise. They argue when these principles are neglected or violated, it is more likely that small organizational errors escalate into an incident or crisis. By using a triangulation of research methods (desk research, document analysis and semi-structured interviews) the CRO of airport Eindhoven was researched in light of the five principles. Document analysis focussed on the two leading response plans the ‘Calamiteiten- / Bedrijfsnoodplan’ (CBNP)
and ‘Crisisbeheersplan’ (CBP). A total of 10 interviews were conducted that focussed on the perception of actors in various organizations that take part in the CRO. The five principles were divided into different aspects in order to create indicators for measurement.

An analysis was made in order to determine whether the CRO of airport Eindhoven can be characterized as a HRO. In view of principle 1 the CRO is considered to be active in searching and reporting weak signals of failure. An open reporting culture without fear of blaming is promoted. Failure reports and actual incidents are evaluated with the partners, but the sharing of weak signals of failure that are not likely to have an impact on the CRO is perceived as undesired. This sets the boundary between mono- and multidisciplinary. In view of principle 2 the CRO is reluctant to simplify which shows from the lean and concise formats of the CBNP and CBP. People who work in the air force or firefighting are known for their questioning attitude and not easily taking things for granted, which is a good attitude. Yet there are some complications for the multidisciplinary communication because of differences in terminology. Also the format of situation reports shows little room for the first impression of people who experience an incident or crash; this could lead to a loss of discriminatory detail. The analysis of principle 3 shows that military and civil operational actors in the role of first responders have regularly contact, which creates mutual trust and respect. Yet the many operational actors consigned for multidisciplinary coordination in for example a ‘Regionaal Operationeel Team’ (ROT) have little moments in which they can experience the work, which is a concern for their knowledge and expertise. Regarding principle 4 there are repetitive choices for table top exercises, mainly due to incapability of the Veiligheidsregio (VR), which is problematic for the building of resilience. Nevertheless the CRO has an active attitude towards learning and growing by creating new response repertoires, this has showed from the large scale multidisciplinary exercise named ‘First Strike’. With reference to principle 5 it is clear that the CRO respects the expertise of operational actors. These actors have the skills and knowledge to run the operations and let the organization recover from setbacks after an incident. Although the CRO consists of traditional hierarchical organizations this does not pose limits on the response repertoires of the CRO, but during emergency responses operational leadership has the upper hand in decision making.

Before answering the research question it is stressed that the characterization of HRO is not an objective scale for measurement. Hence being characterized as a HRO does not imply the
organization is invulnerable to incidents or crises; it does show the organization performs mindful practices that contribute to safety.

“In conclusion the CRO of airport Eindhoven can be characterized as a high reliability organization, provided that the discrepancies are best explained by the differences in organizational structure of the separate organizations and the general restraint to perform tasks that have little to no impact for the CBP because of an incapacity of public policy makers.”

Finally the following recommendations were made in the form of small steps in the development of mindfulness. A key thing to remember is that mindfulness should be a continuous process that is part of daily operations; therefore it does not end with possible implementation of recommendations. A small step in the development of preoccupation with failure is to restate organizational safety goals so that they suggest the avoidance of certain failures because this might help people to detect failure, this relates to a dispute between military actors of operations and logistics at the air base (i.e. flyers and mechanics). A small step in the development of reluctance to simplify is to take in consideration the importance of a detailed first impression regarding situation reports (SITRAPs) according to the CBNP and CBP. The current SITRAP mostly focusses on quickly checking the boxes before dissemination, whereas the option to start with for example 5 empty lines in which the person can write its first impression can help to preserve important details. After all people tend to forget things easily in urgent or chaotic situations. In view of plan making of the CBNP and CBP it is advised to increasingly involve operational actors, not only to obtain practical information but also to break their fixations and earlier interpretations of plan, because people tend to hold on to believes such as ‘the plans are too big and don’t reflect reality’. For developing sensitivity to operations and commitment to resilience it is advised to focus on smaller and flexible response repertoires that can be quicker and easier used for training. Although it might be problematic for plan- and policy making, the exploration of ad hoc self-organizing crisis response units who use rich media platforms for communication can improve resilience. The use of rich media can also create better imaging with liaison officers who take part in multidisciplinary coordination at the VR in the centre of Eindhoven. Finally in light of deference to expertise it is important to be alert on the fallacy of centrality, because leadership at the VR is less likely to understand what happens at the airport. In the end the experts must be on the right location, which is airport Eindhoven.
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<th>Description</th>
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<tbody>
<tr>
<td>ATC</td>
<td>Air Traffic Control (luchtverkeersleiding)</td>
</tr>
<tr>
<td>CBNP</td>
<td>Calamiteiten- / Bedrijfsnoodplan (relates to Eindhoven Air Base)</td>
</tr>
<tr>
<td>CBP</td>
<td>Crisisbeheersplan (relates to airport Eindhoven)</td>
</tr>
<tr>
<td>Cdo KLu</td>
<td>Commandopost Koninklijke Luchtmacht</td>
</tr>
<tr>
<td>CMT</td>
<td>Crisis Management Team</td>
</tr>
<tr>
<td>CoPI</td>
<td>Commando Plaats Incident</td>
</tr>
<tr>
<td>CRO</td>
<td>Crisis Response Organization</td>
</tr>
<tr>
<td>EA</td>
<td>Eindhoven Airport N.V. (specific for civil flights)</td>
</tr>
<tr>
<td>GBT</td>
<td>Gemeentelijk Beleidsteam</td>
</tr>
<tr>
<td>GRIP</td>
<td>Gecoördineerde Regionale IncidentenbestrijdingsProcedure</td>
</tr>
<tr>
<td>HRO</td>
<td>High Reliability Organization (or Organizing)</td>
</tr>
<tr>
<td>KL</td>
<td>Koninklijke Landmacht</td>
</tr>
<tr>
<td>KLu</td>
<td>Koninklijke Luchtmacht</td>
</tr>
<tr>
<td>KMar</td>
<td>Koninklijke Marechaussee</td>
</tr>
<tr>
<td>LCMS</td>
<td>Landelijk Crisis Management Systeem (national registration of crises)</td>
</tr>
<tr>
<td>OvD</td>
<td>Officier van Dienst</td>
</tr>
<tr>
<td>O&amp;V</td>
<td>Opvang &amp; Verzorging</td>
</tr>
<tr>
<td>POB</td>
<td>Persons on Board</td>
</tr>
<tr>
<td>PVE BRW</td>
<td>Productverantwoordelijke Eenheid Brandweer</td>
</tr>
<tr>
<td>RBT</td>
<td>Regionaal Beleidsteam</td>
</tr>
<tr>
<td>ROT</td>
<td>Regionaal Operationeel Team</td>
</tr>
<tr>
<td>SITRAP</td>
<td>Situatierapport</td>
</tr>
<tr>
<td>Vlb EHV</td>
<td>Vliegbasis Eindhoven (air base, specific for military operations)</td>
</tr>
<tr>
<td>VR</td>
<td>Veiligheidsregio (relates to Brabant-Zuidoost)</td>
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Chapter 1: Introduction

“When people are in thrall of predetermination, there is simply no place for unexpected events that fall outside of the realm of planning.” (Weick & Sutcliffe, 2007, p. 66).

The fallacy of predetermination – Henry Mintzberg

The first chapter of this research is the introduction. This research looks into the topic of resilient performance by ‘High Reliability Organizations’ (HRO) for managing the unexpected. Contemporary life in western democratic societies has an increasing demand on resilience (C. Aradau, 2014). Resilience is a popular buzzword used by many actors such as public administrators for crisis management, stating a social system should rely on its ability to cope with change during and after crisis situations. According to Aradau (2014) the proliferation of resilience is correlated to the continuity of (neo) liberal governance, in which a reduction of government influence also leads to the abolishment of the promise of security. In other words, more self-reliance is necessary because the government is no longer able to supply security. Furthermore social systems have become more interconnected and interdependent (Topper & Lagadec, 2013), are essentially highly complex (Perrow, 1999), and often function in a multidisciplinary network environment which makes them more vulnerable for disturbances.

HROs are organizations that successfully avoid crises and disasters in an environment where incidents are likely to happen due to complex systems and high risks (Weick & Sutcliffe, 2007). The best known HROs are aircraft carriers, nuclear power plants, firefighting units and air traffic control centres. Weick & Sutcliffe, amongst other academics, looked at the best practices of organizations characterized as HROs, and created five principles for resilient performance. These five principles are ways of acting and styles of learning that can help organizations to improve their resilience. The five principles are: preoccupation with failure; reluctance to simplify; sensitivity to operations; commitment to resilience; and deference to expertise. These principles will be explained thoroughly in the theoretical framework. Generally a well performed management of the five principles results in a mindful organization. Through mindfulness organizations can anticipate to small disturbances with flexibility and have a better chance to contain actual incidents in order to prevent escalation into crises.
Airport Eindhoven

The organization that was studied is airport Eindhoven. With over 5,000 military, 30,000 civil and 7,000 recreational flights in the year 2015 (Klu, 2016a), Airport Eindhoven is the second biggest airport of the Netherlands and it is located in the municipality Eindhoven. An increase in the number of civil flights is expected, an estimated total of about 43,000 is expected in the year 2020 (Rijksoverheid, 2015). Airport Eindhoven is officially a military airbase called ‘Vliegbasis Eindhoven’¹ (Vlb EHV), owned by the Koninklijke Luchtmacht² (KLu). The civil fellow user is ‘Eindhoven Airport N.V.’ (EA). When speaking of airport Eindhoven, both the military and civil part of the organisation are meant. When referring to the military or civil part seperately, the abbreviations ‘Vlb EHV’ or ‘EA’ will be used. Airport Eindhoven is open every day of the year, with 17 hours a day of flight operations. Air traffic control (ATC) is operated by military personnel of Vlb EHV. A total of 700 people, of which 95% military, work on Vlb EHV on various tasks related to ATC, military air transport, aircraft maintenance and other facilitating tasks. Vlb EHV supports military operations, humanitarian missions and special tasks in peace, crisis and war time by deploying air transport on any place in the world. Civil user EA allows airline companies, charters and general aviation to make use of the airport.

The airport has a fire risk classification of 8, according to the Aeronautical Information Publication of 2009 and annex 14 of International Civil Aviation Organisation. This is a theoretical estimation of the required firefighting capability assessed on the biggest aircraft that can land on the airport. When necessary and announced beforehand, the airport can expand to fire risk classification 9 or 10 in order to allow for bigger aircraft to land. The task of Vlb EHV is to maintain a safeguard of civil and military passengers, (military) personnel and cargo on the airport (Klu, 2016b). Airport Eindhoven aims to operate as safe as possible in order to prevent incidents. Safety measures are embedded in many operations such as: air traffic control (ATC), take-off and landing procedures, taxiing, boarding and disembarking, bird control etc. Despite efforts in the prevention of incidents the chance of failure always exists (Helsloot et al., 2011). Managing an airport involves complex operations often paired with a tight coupled working schedule (Perrow, 1999). Due to the complexity and tightness of working conditions, possible errors and surprises are always lurking. If any unexpected outcomes happen, they are often difficult to anticipate on (Weick & Sutcliffe, 2007). Besides

¹ English: Eindhoven Air Base
² English: Royal Netherlands Air Force
all preventive measures and anticipations, the possibility of incidents still exists. Sometimes precautions fail, and unexpected outcomes escalate into a crisis. When talking about airport Eindhoven in this respect, the Hercules disaster of 1996 always comes to mind. On a Monday evening on 15 July 1996 a Belgian C-130 Hercules transport airplane crashed on airport Eindhoven. It was carrying 41 persons, 4 Belgian crewmembers and 37 others, mostly members of the fanfare of the Royal Netherlands Army. The aircraft took off earlier that day from Villafranca to bring back the Dutch brass band from training in Italy. The aviation incident occurred while the aircraft came into land and hit a flock of birds on the two left engines; hereafter the crew decided on low altitude to make a go-around. Unfortunately the aircraft lost power, took a sharp turn to the left and crashed. Immediately after the crash the aircraft caught fire, which got intensified by the aircraft’s oxygen system (ASN, 1996). In the end 34 people died due to the crash: the 4 Belgian crewmembers, 28 members of the Dutch fanfare, a civil musician who was substituting a member, and a member of the Dutch Defence Organization for logistics (Matheeuwsen, 2009, p. 8).

H. Matheeuwsen (2009), former editor in chief of daily newspaper ‘Eindhovens Dagblad’, has been researching and reporting the Hercules disaster since 1996. According to him the disastrous outcomes of the crash could have been prevented; the amount and severity of casualties was unnecessary. Due to a lack of information about the number of persons on board, the fire department assumed there were only crewmembers on board, so firefighters started extinguishing the fire and later found out the airplane also had other people on board. Structural mistakes with governmental organizations in both the preamble and the aftermath of the crash is what led to the Hercules Disaster of 1996 says Matheeuwsen (2009). Former mayor of Eindhoven R. Welschen (2005) stated the Hercules disaster will always be known as the crisis response disaster. Many investigators wonder whether more lives could have been saved if the first responders started evacuating faster. The military firefighters directly on site did not start evacuating immediately because they were not told the airplane held more people beside the crew. The civil fire department was not alarmed quickly, therefore arrived 12 minutes too late. 40 minutes after the aircraft caught fire the evacuation started and the remaining living (but heavily burned) people were taken out of the aircraft (Welschen, 2005). Although Welschen was on holiday at the time of the crash, he went to Eindhoven the next day, after which a long period of investigations followed. A lot has changed since the disaster of 1996, the airport and municipality of Eindhoven was put on edge. Despite structural improvement of the organizations involved, the possibility always exists that an
airplane crashes on an airport or near in its surroundings. Then it all comes down to a Crisis Response Organization (CRO).

**Crisis Response Organization**

Besides all preventive safety measures chances of failure always exist. Therefore airport Eindhoven invests time and resources in repressive (or reactive) safety measures such as: firefighting equipment, crisis plans and incident training (Klu, 2015). All repressive resources are part of the CRO which consists of manpower, response plans and material, which can be deployed in case of emergencies. The CRO at airport Eindhoven aims to counter incidents or crises by attempting to contain and deescalate any event, and (if possible) bringing the airport back to normal conditions as soon as possible.

Activities on the airport are potentially dangerous and involve many risk factors. For example flight operations, airplane refuelling and ammunition storage and transport. The possibility exists that small errors or failures, either from internal or external causes, develop into a larger incident or crisis. Vlb EHV, as controller of flight and ground operations, needs to be prepared for such an event. If anything was learned from the Hercules disaster it is the necessity of a functioning CRO. Disastrous outcomes can be prevented by a coordinated multidisciplinary response. Fast alarm calls to emergency responders followed by a coordinated and adequate response is crucial. The CRO of Airport Eindhoven is based on two response plans: (1) Calamiteiten- / Bedrijfsnoodplan (CBNP)³, as an internal system under military command, and (2) Crisisbeheersplan (CBP)⁴, as the multidisciplinary system under the command of Veiligheidsregio Brabant-Zuidoost (VR)⁵. The CBNP is a tactical response plan for internal use on the airbase. It describes the functioning of the organisation in case of emergency, both for aerial and non-aerial circumstances. It furthermore contains procedures, scenarios and plans that support coordination of a response action (Klu, 2015). The CBP is the leading strategic response plan in case of crisis situations that require a multidisciplinary approach. It describes three scenarios (i.e. (expected) airplane accident, infectious diseases and hijacking / hostage) and organisational and procedural activities for crisis response (VR, 2015). The content of response plans as well as special firefighting material will addressed more thoroughly later in the research. According to the Wet Veiligheidsregio’s⁶ of 2010, the

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³ English: Calamities- / Company Emergency Plan
⁴ English: Crisis Control Plan
⁵ English: Safety Region of South-east Brabant
⁶ English: Law Safety Regions 2010
The coordination of the multidisciplinary response is based on the Gecoördineerde Regionale Incidentbestrijdings Procedure (GRIP). GRIP is a nationwide procedure in the Netherlands for incident response. The procedure follows the principle of upscaling according to the affected area and the size of an incident (Helsloot et al., 2011).

**Problem outline**
The primary problem HROs fear is organizational mindlessness, thus the absence of mindfulness. This means an organization does not consist of a mindful infrastructure to recognize and correct small errors, so enlarging the possibility of small errors escalating into a crisis. Mindless operations are potentially dangerous because problems might not be visible due to blind spots. In this way multiple problems can add up, and reach a point of no return, which is more likely to result in incidents or crises. Airport Eindhoven does not allow for incidents or crises to happen. The safeguard of flight operations is the number one priority, in this respect airport Eindhoven is inspired by the hard-won lessons of HROs. But a key thing to remember is that despite HRO’s best practices, they also make mistakes. They are not immune to errors, yet they have learned how to convert errors into enhanced resilience of the organization (Reason J., 2000, p. 770). The problem outline is distinguishable into three problems that any organization faces. The problems will be addressed as follows. First is the problem of human fallibility, simply said humans make mistakes. Although this is an unsolvable problem, there are different approaches to respond to human fallibility. The second problem is the nature of unexpected events. Weick & Sutcliffe (2007) claim that HROs are better in ‘managing the unexpected’, but in order to engage the unexpected mindfully, you first need to understand how expectations work. The third problem is the fallacy of predetermination. That is to say plans create shortcomings because it makes a person focus on predetermined points, which leaves less room for people’s situational awareness. Hence the CBP of airport Eindhoven is already a potential danger for
mindfulness. Furthermore there is a difference between the paper reality as described in
plans, and the perceived reality of people who have to work with the plans.

The problem of human fallibility
In any organization there are humans that make mistakes, also in HROs. This problem is not
to be solved, yet the approach to deal with mistakes is variable. The primary or traditional
reaction to an incident or a crisis is usually bound to disciplinary or correcting actions. In
light of the rotten apple theory you remove the malfunctioning individual because one bad
apple spoils the whole bunch (Gottschalk, 2012). Generally it is highly doubtful an
organization will continue with improvement after dismissing the one rotten apple, since
many incidents are bound to systems failure. After the Hercules disaster three military
individuals were appointed as responsible for the failed crisis response and thereafter fired
(Volkskrant, 1997), which led to criticism because some people believe the disaster was build
up by systemic organizational failure. The main idea in the system approach to human
fallibility is that errors are seen as consequences of (multiple) systemic factors, instead of the
behaviour of one single individual (Reason J. , 2000). Another reaction to human error is that
after an incident or crisis there is often a plead for a tighter organization with more safety
measures and procedures, a stronger hierarchical command and control, and more instruction
and training (Weick & Sutcliffe, 2007, p. 8). The immediate questions that arise in the
aftermath of an incident are usually focussed at safety procedures, and whether these
procedures were executed according to plan. Further questions will be asked about the
relationships between authorities and the formal responsible actors or entities (Weick &
Sutcliffe, 2007, p. 8). Despite questioning and possible blaming in the direct aftermath of a
crisis, there are often many other explanations that can declare flaws in an organisation that
might be related to the crisis. The human factor is often underestimated.

The nature of unexpected events
As stated earlier some organizations exceed others in managing the unexpected. In order to
do this you first need to understand how expectations work, and how to be mindful in
engaging them. Expectations include strengths and weaknesses. Considering strength, Weick
& Sutcliffe argue expectations bring order and predictability, which are built into
organizational roles, routines and strategies, however the weakness of expectations is that it
causes blind spots that allows small errors to escalate into bigger disturbances (2007, p. 23).
To redress the blind spots, they argue: “[...] organizations try to develop a greater
awareness of discriminatory detail. This enriched awareness, which we call mindfulness,
uncovers early signs that expectations are inadequate, that unexpected events are unfolding, and that recovery needs to be implemented. Recovery requires updating both of one’s understanding of what is happening and of the lines of action that were tied to the earlier expectations.” (Weick & Sutcliffe, 2007, p. 23). An appeal for an enhanced organizational awareness or mindfulness to target blind spots is a positive endeavour, yet difficult to achieve. L. Clarke (1993) examined a phenomenon what he calls the ‘disqualification heuristic’. It means that people tend to seek for confirmation of their expectations, naturally neglecting information that does not suit their expectation. The disqualification of disconfirming information is a form of human fallibility, because generally people are more interested in reducing uncertainty and increasing control (Clarke, 1993). In crisis situations it is even more likely that people seek confirmation, and neglect information that does not match their expectations (Snyder & Stukas, 1999). This is related to increased stress in the heat of the moment of unexpected events.

Differing in nature, unexpected events can be categorized in three forms:

<table>
<thead>
<tr>
<th>Event</th>
<th>Simplified example</th>
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<tr>
<td>Expected event fails to occur.</td>
<td>Fatigued firefighting units are expected to perform worse compared to a new unit, yet fatigued crews have already worked out their coordination and rhythm. New units often perform worse in the beginning and need time to calibrate.</td>
</tr>
<tr>
<td>Unexpected event does happen.</td>
<td>The occurrence of an event that has a reputation of occasionally going wrong, but it fails multiple times in a row, which is against expectations. This gives a suggestion of a latent (systematic) failure instead of repeating unfortunate failures.</td>
</tr>
<tr>
<td>Unthought-of event happens.</td>
<td>Infinite possibilities. This event is most significant to understand. Mindful practice should encourage imagination.</td>
</tr>
</tbody>
</table>

Table 1: Forms of unexpected events (Weick & Sutcliffe, 2007, pp. 27 - 29).

In all three forms it starts with an expectation. Holding on to expectations will lead to confirmation seeking to prove your point is right. But all viewpoints are limited. Reality could show that things turn out not as expected. After realization comes to mind, failures can already be escalated to problems. This leads to the idea of mindfulness, which is strongly related to the concept of awareness. Defined as ‘a rich awareness of discriminatory detail’, Weick & Sutcliffe (2007, p. 32) explain that when people act, they are aware of the detailed
context, and of deviations from their expectations. Some scholars mention ‘situation awareness’ (Endsley, 1995) or ‘situational assessment’ (Klein, Orasanu, Calderwood & Zsambok, 1993) in which people create expectations, however mindfulness exceeds by scrutinizing existing expectations and refine them to a more nuanced appreciation in context (Langer, 1989). The most apparent example of a mindful organization is an aircraft carrier running flight operations. Weick & Roberts (1993) examined why aircraft carriers experience very few accidents despite operating in dangerous and complex environments. They concluded aircraft carriers practice mindfulness by five distinguishable principles that entails failure, simplification, operations, resilience and expertise. This was an incentive to the book ‘managing the unexpected’.

The fallacy of predetermination
The third addressed problem which is related to unexpected events is the fallacy of predetermination, thus the problem that plans create shortcomings. Planning tends to go to the opposite way of mindful organizing. Plans can create mindlessness instead of mindfulness. According to Weick & Sutcliffe (2007) this happens in at least three ways. Firstly plans are built from assumptions and expectations, so people are influenced in what they choose to see and choose to ignore. The second problem refers to a decrease in organizational functioning since plans specify contingent actions that have to cope with the future. Contingent actions restrict attention to what is expected and plans preclude improvisation. The third problem is the assumption that a repetition of patterns of activity will lead to a consistent high quality outcome. An example is that routines cannot handle new events (Weick & Sutcliffe, 2007). The mentioned problems exist in every organization, but not all organizations approach the problems in the same way. For an organization to become characterized as an HRO it will need to have a system approach towards human fallibility, it will need to perform in a way that enhances their resilience towards unexpected events, and it will need to be reluctant considering the fallacy of predetermination. The problems need to be countered by using the five principles that are described in HRO theory. This leads to the research objective and the research question.
Objective and research question

Research objective
The objective of this research is to examine HRO theory and compare this to practices in the multidisciplinary environment of the CRO of airport Eindhoven. Not only to explain differences between theory and practice, but also to elucidate on the paper reality of the CBNP and CBP, and the perceived reality of actors in the CRO.

Research question
To what extent can the Crisis Response Organization of airport Eindhoven be characterized as a High Reliability Organization, and how can discrepancies be explained?

Societal relevance
This research is performed to elucidate on the organizational functioning of the CRO of airport Eindhoven. Civil organizations (and citizens in particular) are users of the airport, so technically they also make use of the CRO. Incidents and crises on airports can happen, so people demand an airport with a well-functioning CRO. On airport Eindhoven the majority of flights are civil flights and the number of civil flights is still increasing, thus the airport will get busier every year. Airplane incidents or crashes are no longer accepted by society, and if any incident occurs, society definitely does not tolerate any problems in emergency response. Especially after the dis-functioning in the emergency response during the Hercules Disaster, there is very little tolerance for mistakes in emergency response. Society therefore has benefits with a research on the crisis response organization of the airport.

Scientific relevance
Findings of this research may add relevant information to the general body of knowledge of crisis management. More specifically it can find information about HRO in CROs in a multidisciplinary environment. The absence of information in such environments can be typified as a knowledge gap. By means of existing literature in high reliability organizing, this research potentially improves on academic research by questioning the existence of HRO practices in a CRO on an airport.
Scope of the research
This research looks into the CRO of airport Eindhoven. This organization is a multidisciplinary organization consisting of military and civil parties. The parties that will be addressed are:

- Military parties of Vlb EHV:
  - Commando KLu;
  - Operations and Logistics
  - Airport Services (e.g.: ATC, military fire department)
  - Bureau Bedrijfsveiligheid (e.g. ground- and flight safety)
- Civil parties:
  - EA
  - Municipality Eindhoven
  - VR Brabant-Zuidoost
  - Civil fire department Brabant-Zuidoost

Other stakeholders in the CRO are: GHOR Brabant-Zuidoost; GGD Brabant-Zuidoost; Police Unit Oost-Brabant; and Koninklijke Marechaussee. Although these stakeholders are involved in the CRO according to the CBP, they will not be examined in this research. More information is given in chapter three research design. Furthermore this research looks solely into organizational aspects of the CRO. The functioning of technical equipment is not part of the research.

Structure of the research
This is the end of the first introductory chapter. The second chapter will provide the theoretical framework in which HRO theory will be explained. It will focus on the five HRO principles of resilient performance. The third chapter provides the research methodology which clarifies the choice of methodology, the process of data collection and analysis, and finally the limitations of the research. The fourth chapter is the analysis of the collected data. This includes document analysis of the CBNP and CBP as well as the interviews that were held in the CRO, leading to the concluding answer of the research question. The fifth and final chapter is the discussion and reflection on the findings against the background of the theoretical framework, followed by recommendations for policy and future research.
Chapter 2: Theoretical framework

The second chapter is the theoretical framework and consists of the theoretical viewpoint of the fundamental academic literature of HRO. Before arriving at the main HRO theory for this research, it is important for a better understanding to put the subject in a broader framework of academic views on crises and disasters. Therefore the chapter starts with a general introduction of academic views on crises and disasters, including the risk society by U. Beck (1992), the pessimistic view on disasters by C. Perrow (1999) and the rather optimistic view by A. Wildavsky (1988). This is followed by describing the main theory of HRO by Weick & Sutcliffe (2007) and the five principles of anticipation and containment. Finally HRO theory will be specified by providing a clear conceptualisation of terms in the operationalization scheme. Throughout the framework other relevant academic literature from the field of HRO will also be addressed.

Academic views on crises and disasters
According to Beck (1992) the scientific and industrial development of the Western world has led to a risk society. Due to the creation of a ‘new dimension’ of risks, society poses a threat on itself and on future generations (Beck, 1992). The risks in current society are characterized by issues of uncontrollability and accountability, because industrialized hazards often pose risks that reach beyond state borders. He uses the example of the nuclear disaster of Chernobyl in 1986 to illustrate the enormous destruction of worst case scenarios in current risk society. A key note of industrial size disasters is that humans can easily become victim without being part of the operational process. When living in the proximity of industrial activities or in the case of this research an airport, humans are (often unconsciously) affected by the risks of potential disasters or crises (Helsloot, Lukkes, & Folkers, 2004, p. 357).

When trying to prevent disasters, it is important to understand how disasters or crises occur. One might argue that an estimate of 80 percent of all disasters happen because of human error, whereas the other 20 percent would occur due to a technical error (Duin, van., 2008, p. 348). The classical response is to blame the responsible authority or formal liability in the aftermath of a disaster or crisis, as J. Reason (1990; 2000) explains in the traditional ‘person approach’ as one of the problems in human fallibility. Yet the assumption is made that solely an individual human error as underlying factor is too marginal. Scholars as B. Turner (1997)
and Weick & Sutcliffe (2007) argue the existence of disasters and crises is dedicated to a larger organization of people. W. Zwaard & E. de Koning (2009) state safety, security and risks can only be analysed and controlled when technique, human behaviour and organizational factors receive enough attention. Organisational failure can exist for months or years and eventually lead to a disastrous event (Turner, 1997). In other words crises can be seen as a processual system, in which a long incubation process suddenly manifests into the event itself (Roux-Dufort, 2007). Roux-Dufort (2007) criticizes the event-centred approach to crisis management; according to his approach crises have a positive side as they potentially reveal organizational flaws that otherwise would have remained unnoticed.

C. Perrow (1999) his normal accidents theory has a rather pessimistic view by stating disasters or crises are inevitable. Neither human- nor organizational error explain disasters; the complexity and tight coupling of systems make processes hard to control and lead to disasters (Perrow, 1999). As an example he describes corporations in the chemical sector. If something goes wrong in the chemical industry it is very hard to control the outcome of the event. Because of complex processes normal accidents are likely to occur. So any mistake has potential to escalate quickly, which due to the tight coupling can create a domino effect. In other words, small mistakes easily lead to bigger problems and eventually create a disaster.

Besides all efforts to prevent a disaster from happening, the risk that something goes terribly wrong always exists. H. Boutellier (2004) describes the unreachable situation that security is. Safety or security is a utopian concept, because 100 percent safety or a guaranteed security simply does not exist (Boutellier, 2004, p. 126). Provided that the chance of a disasters or crises will always be present, it is important to prepare for various scenarios. Scholars like A. Wildavsky (1988) and K. Roberts (1993) share a more optimistic view of risks and believe the acceptance and understanding of risks can contribute to society. Wildavsky (1988) acknowledged the usefulness of risks and argued for a strategy of anticipation and resilience. This means you anticipate on the manifestation of common problems by applying prebuilt plans, or you act resilient towards problems that are unknown or unclear by using a combination of flexibility and variety (Wildavsky, 1988). This strategy leads to the theoretical paradigm about HRO.
High Reliability Organizations

Roberts (1993) is one of the fundamental researchers that contributed to the paradigm of HRO. HRO consists of organizations that characterize high reliability by successfully avoiding disasters in an environment where normal accidents can be expected due to risk factors and complexity (Roberts, 1993) (Weick & Sutcliffe, 2007). So what are these characteristics that HRO organizations poses? And how do HROs cope with uncertainties in a time where the unexpected seems to become a greater part of life? According to B. Topper & P. Lagadec (2013) current society is increasingly more vulnerable to relatively small disturbances. For instance the tight-coupled systems of Perrow (1999) change into total interdependent systems, and complexity turns into the unreadable (Topper & Lagadec, 2013). That is to say that e.g. cheaper travel, the expansion of internet and just-in-time supply chains created underlying drivers of crises. For this reasons it is not surprising that managers and practitioners in crisis management find themselves more and more interested in resilience.

Weick & Sutcliffe made several publications in light of HRO theory. Their book from 2007: ‘Managing the Unexpected: Resilient Performance in an Age of Uncertainty. Second Edition.’ forms the base of the theoretical framework of this research. Weick & Sutcliffe (2007) examined several organizations which they refer to as HROs, such as emergency rooms, flight operations of aircraft carriers, and firefighting units. These organizations are able to cope with unexpected events and have created ways to manage these events better than other organizations (Weick & Sutcliffe, 2007). By using 5 principles (i.e. preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience and deference to expertise), they created an infrastructure to build mindfulness in organizations. In other words, when these 5 principles are neglected or violated, small errors are more likely to escalate into an incident or crisis. The principles are divided into two clusters. Principle number 1 up to and including number 3 are principles of anticipation. These principles are abilities to become aware of small discrepancies and errors, and thereafter being able to slow them down or even stop them (Weick & Sutcliffe, 2007, p. 45). Principle number 4 and 5 are actions of containment, hence the reactive actions to prevent any unexpected outcome from worsening into disastrous outcomes (Weick & Sutcliffe, 2007, p. 65).
The five principles of HRO

Figure 1 below shows a model of the five HRO principles. The principles will be explained in separate paragraphs, starting with the three principles of anticipation and thereafter the two principles of containment.

![Figure 1: Model of five HRO principles (Weick & Sutcliffe, 2007).](image)

**Principle 1: Preoccupation with failure**
The first principle ‘preoccupation with failure’ is one of three principles of anticipation. It is an organizational ability to track down weak signals of failure, and to report and stop them (Weick & Sutcliffe, 2007, p. 46). Weak signals of failure are symptoms of larger problems in a system, and the longer these weak signals exist, the less predictable and controllable the systems become (Weick & Sutcliffe, 2007, p. 47). But tracking down these weak signals of failure is easier said than done, because some failures might not be visible for every employee in an organization. Some situations may give a weird gut feeling but the reason why is not clear. Furthermore it is not functional to report every single small issue to a superior in an organization. Reason (1997) states failures are most likely to occur on places where humans interact with the system, thus in activities where human actions or decisions are made. In the ‘Swiss cheese model’ Reason states HROs are the prime examples of the system safety approach (2000, p. 770). HROs are not immune to errors or incidents, but they are likely to be more effective in creating defences, barriers and safeguards due to learning through previous errors. As mentioned in the theoretical framework the problem in human
fallibility is the traditional ‘person approach’ to incidents. Whereas in a ‘system approach’ errors are seen as consequences rather than causes. The system is illustrated as a stack of slices of Swiss cheese (see figure 2). The holes are opportunities for a process to fail, though unlike real cheese, the holes in de model open, close and change location. So if all holes in the different slices are in line, an error or incident happens. Holes in the defensive layers (slices) are created by active failures and latent conditions. Active failures are acts that are directly in contact with an incident. Latent conditions are underlying errors in the organization that contributed to an incident. Nearly all negative outcomes arise because of combination of both factors (Reason, 2000).

By definition errors, surprises and unexpected events are predecessors of incidents and crises, which can occur before they are noticed (Weick & Sutcliffe, 2007, p. 65). It is of importance to detect these predecessors as soon as possible. Weick & Sutcliffe (2007) define this capability of early detection as ‘reacting mindfully’. If an organization has the ability to react mindfully, a higher degree of organizational reliability can be achieved. So an organization with a higher the degree of organizational reliability is less likely to let errors, surprises or unexpected events develop into an incident or crisis. Ways to promote the capability to react mindfully is to stimulate people to think about vulnerability of the organization and let them talk about this with others. Also letting people define and report near misses can help to prevent incidents.
Principle 2: Reluctance to Simplify
The second principle ‘Reluctance to Simplify’ is another principle of anticipation. It was stated earlier that expectations are built into organizational roles, routines and strategies to bring order and predictability in the organization (Weick & Sutcliffe, 2007, p. 23). In other words simplifications of the real world are made by writing down possible scenarios that are used to focus procedures and work instructions on. HROs find it problematic to accept such simplifications because they take away the attention towards reality, therefore HROs are reluctant to simplify. It relates to an organizational ability to question and discuss issues and to invite people to be sceptic and look different to aspects of the organization (Weick & Sutcliffe, 2007, p. 53). The principle reluctance to simplify is likely to have effect on the CBP and CBNP, because those plans are the main concepts that the CRO uses. Despite having such plans with predetermined scenarios, HROs like to ask people if they have seen anything out of the ordinary, for example something that was not written down in the procedure but did occur during an event.

A form of simplification that is not avoidable is the creation of labels or categories. Weick & Sutcliffe (2007, p. 54) mention the hazard of labels, which is the appointing of words to problems. People name what they see and the name they choose to describe the situation is of great importance for the organization. Especially when the labels are shared between people inside an organization or in between multiple organizations. The ‘Shareability constraint’ by R. Baron & S. Misovich (1999) suggests that when people make sense of an unexpected event, they don’t immediately name it, so the impression is strong but not yet shared. As soon as an impression needs to be shared it gets a name, and it falls into a type, category or stereotype (In: Weick & Sutcliffe, 2007, p. 57). In interactions between people or organizations these labels draw away the attention from details. And when details are lost there is a lesser chance to find early warning signs. Weick & Sutcliffe explain: “We mask deviations when we use vague verbs such as impact, affect and determine; vague adjectives such as slow, sufficient and periodic, and vague phrases such as as soon as, if required and when directed.” (2007, p. 58). This is the main reason why HROs inspire people to raise doubts and ask for information, because people should carry categorizations lightly.

Principle 3: Sensitivity to Operations
The third principle ‘Sensitivity to Operations’ is the last principle in the series of anticipation. This principle is about the actual work itself. It shifts the attention towards the operational
level. It is an incentive to see what is actually being done in an organization, thus shifting attention away from the strategic level in which designs and plans tell what is supposed to be done (Weick & Sutcliffe, 2007, p. 59). HROs perform interdisciplinary activities that are meant to increase interaction between different parties in the organization. They value face to face meetings between people; this can also be between different disciplines, departments or organizations. Face to face contact could be the richest form of contact because it allows direct feedback. If face to face is not possible the communication by messages can be enriched with media (e.g. imagery, audio or video) in order to maintain the richness of detail (Weick & Sutcliffe, 2007, p. 155). Regarding the response plans of a CRO they have a detailed description of how things must go in order to get a good outcome of a crisis response, yet it is unlikely that events successfully unroll if the operating parties never meet in real life. So the primary threat to this principle is that there is little room for experimenting. Weick & Sutcliffe argue experimental relationships and continuous interaction are essential to find problems that have not yet been anticipated (2007, p. 61). Other threats to this principle are routine jobs and the interpretation of near misses as a kind of success. Routine jobs are dangerous because they indicate an automatic mindless activity, and interpreting near misses as a kind of success is wrong, because it is actually an indication for potential danger (Weick & Sutcliffe, 2007, pp. 60 - 62). Whether these threats are actually in an organization has for a big part to do with the command and control. When the command and control of an organization is very rigid or stiff, the organization tends to have less tolerance for rule deviant behaviour. This means they are more focussed on rule compliance instead of mindful operations. Thus more focussed on ‘doing things the right way’ instead of ‘doing the right things’, which runs the risk that people are less busy focussing on the job itself.

**Principle 4: Commitment to Resilience**
The fourth principle ‘Commitment to Resilience’ is one of two principles of containment. As mentioned previously this differs from anticipation. Containment aims to prevent any unexpected outcome from worsening into disastrous outcomes (Weick & Sutcliffe, 2007, p. 65), in other words, anticipation failed, the unwanted event happened and now needs to be contained. Weick & Sutcliffe (2007, p. 69) argue the reactive world of the unexpected is just as important as anticipation and planning. Resilience is defined as: ”The capability of a system to maintain its function and structure in the face of internal and external changes and to degrade gracefully when it must” (Allenby & Fink, 2005). According to Wildavsky (1988) resilience is better for safety than anticipation, because by experiencing trial and error you
can spread risks and keep unwanted outcomes relatively small. When anticipation is on the upper hand, it will in the end be a bigger setback if the lines of defence break. His nuanced opinion entails a model with both anticipation and resilience, with a bigger focus on resilience (Wildavsky, 1988).

There are three components of resilience. Firstly the ability to absorb strain and continue functioning through fast negative feedback. Second is the flexibility of the organization, thus after the absorbed strain being able to bounce back and recover. Third is the ability to learn and grow from things that happened (Weick & Sutcliffe, 2007, p. 71). In order for the CRO to test its abilities, the organization needs to do multidisciplinary training or respond to real incidents or crises. Furthermore they need to be flexible and actually learn and grow from previous events. Threats to resilience are rapid change, bad leadership, high pressure or workload, competition and demands or interests of stakeholders (Weick & Sutcliffe, 2007). A common pitfall is the primary or traditional reaction to incidents or crises, as was mentioned in the introduction. According to this phenomenon any unexpected outcome is responded with new rules and prohibitions to prevent the same outcome from happening again. In light of HRO theory this is problematic because this reduces the flexibility of the organization, nevertheless reduction of flexibility is not inevitable because of new learning and experiences (Weick & Sutcliffe, 2007, p. 72). Furthermore it is important to note that improvement of resilience can be achieved by enlarging repressive response capabilities, thus not capabilities that belong to the preventive side of an event.

**Principle 5: Deference to Expertise**

The fifth principle ‘Deferece to Expertise’ is the last principle of containment. Without abandoning the hierarchical structure most organizations have, HROs value the ‘powerful’ operational level. To put in another way, higher-up functions in organizations tend to experience less of what’s happening on the work floor, because often information gets filtered before it reaches higher positions (Weick & Sutcliffe, 2007, p. 74). This filtering is problematic because also early signs of error get filtered. These early signs can be of unimportance to people at the operational level but may be visible for people in other levels. A key thing to remember is that ‘expertise’ can refer to anyone in an organization, and does not necessarily mean the person has to be an expert, neither is expertise fixed with a hierarchical position. Expertise can be someone who mastered a certain aspect through
knowledge, practice and experience (Weick & Sutcliffe, 2007, p. 78). HROs know where to find their expertise and use this potential.

HROs know the importance of downward deference towards the people that run the operations. The people that are not part of operations, such as managers or staff employees, need to understand why the organization exists and what makes the operations run. It literally means to see and know what people with dirty coveralls and greasy hands do (Weick & Sutcliffe, 2007, p. 77). Another key point of this principle is that people with expertise are trusted and allowed to make decisions instead of letting people in hierarchical positions decide while they might not be close to the situation. A centralization approach is problematic because a small number of officials on the organizational or strategic level are making decisions while they are further away from the actual crisis than operational leaders. Decentralization is important so decision making can be done on the operational level (‘t Hart, Rosenthal, & Kouzmin, 1993). Thus leaving the decision making to operational actors demands certain competences of them.

A. Boin & C. Renaud (2013) assessed leadership tasks in crisis management and described several activities that leaders are expected to use, which includes sense making, critical decision making and meaning making. For deference to expertise critical decision making is the most relevant. According to G. Klein et al. (1993) decision making of operational leaders in a crisis situation is based on four key factors. The first factor is situational assessment. If an incident occurred and an emergency responder is on his or her way to the event, he or she is already creating expectations of the situation. So before seeing the actual situation, expectations can already come to mind that might influence decision making. The second factor is experience, which is the application of knowledge obtained from former crises or training. The third factor is collective memory; this entails the shared knowledge of the emergency response team. The fourth factor ‘images’ has effect on crisis decision making, but is of less influence (Klein et al., 1993). Images relates to the interpretation of principles, goals and plans, which may vary between individuals. Recent research on operational leaders shows that values are only partially of influence on decisions (de Jong, 2014). This sets complications for procedures and training because emergency responders are more likely to act based on the first three factors. Whereas the primary reaction to a crisis often suggests the procedures must be improved to create better crisis response, this might not always be true.
Analytical framework
In order to determine whether the CRO of airport Eindhoven can be characterised as an HRO, the organization as such was reviewed and analysed on the applicability of the HRO-processes as described previously.
Chapter 3: Research Methodology

This chapter extends on the methodology, comprising the research design into which the analytical framework of the previous chapter will be constructed into a model that is suitable for research. By describing the process this research can be replicable and verifiable. This includes an explanation on the design that was used to analyse the CRO. Thereafter the methodology for data collection will be explained through the process of triangulation. Also a description is giving how the data was analysed. And finally some remarks regarding validity and reliability of this research.

Design

The methodology that was used to conduct this research is a qualitative research with a single case study design. A single case study is the best research design to answer the research question, because it allows a detailed exploration and in-depth analysis on the topic. The holistic approach of case studies permits that behaviour of people and social phenomena can be explained by a complex set of causes, something that simple causal models as most survey analysis are not good for (Swanborn, 2010, p. 18). For this reason the research will not be oriented on variables.

Around the notion of purposive sampling, the case for this research, namely airport Eindhoven, was selected. Which means the research was sampled a priori with a fixed research goal in mind (Bryman, 2012, p. 418). Commander Colonel J. van Soest gave permission for a study on Eindhoven Air Base without restrictions of secrecy (Van Soest, 2016). Despite the commander’s permission regarding the air base, the CRO is a multidisciplinary organization of the entire airport, which further consists of the safety region, municipality and public organizations for emergency response. A study without restrictions on the air base does not automatically mean the entire CRO is accessible, because the public organizations operate independently in normal conditions. Nevertheless one of the clear advantages of a case study is that data can be collected from different groups of stakeholders who might have different perceptions on the topic (Swanborn, 2010, p. 109).

The aim of the case study is to elucidate on unique features of the CRO, which is likely to contain subjective phenomena. A central point is the examination of the interpretation of the
CRO by its participants, which is one the most obvious concern in qualitative research (Bryman, 2012, p. 380). The opinions and experience of persons in the CRO are important (Verhoeven, 2010, p. 118). The research was conducted in normal conditions. This means the case was not subject to a crisis or incidental circumstances at the time of the examination.

The case in this research is airport Eindhoven. The unit of analysis is the CRO of Airport Eindhoven. The research question refers to a phenomenon that occurs in organizations that can be characterized as a social system consisting of subsystems. Observations therefore don’t need to be restricted to solely the organizational level. Interpretations and explanations can be better grounded when data is also collected on the subsystems (Swanborn, 2010, p. 101). To cover a representative group of participants from the CRO, the organization will be divided in two sub-units: management and operational. These two sub-units form the units of observation. Individual conclusions from the units of observation may draw conclusions on the CRO.

**Data collection**

More than one method of data collection was used in this research. A triangulation of methods was used which allows findings to be cross-checked (Bryman, 2012, p. 717). By collecting data from a threefold of sources, and thereafter checking the results between methods, the reliability of the research is likely to be higher (Verhoeven, 2010, p. 167). The used methods are (1) desk research, (2) document analysis and (3) semi-structured interviews.

**Desk research**

The first method of data collection is desk research. This is also known as secondary research or secondary analysis, but in this research only the concept desk research will be used. Desk research entails the examination of existing research, where data has already been collected from earlier studies (Bryman, 2012, p. 13). It is important to examine beforehand what is already known about HROs, so that references can be made. For example Weick & Sutcliffe (2007) studied multiple organizations extensively and wrote their findings down in what can be typified as HRO practices. These earlier studied organizations leastwise include nuclear aircraft carriers, ATCs, aircraft operations systems, nuclear power plants and firefighting crews. HRO practices that have been obtained from these organizations were used as a reference for research at the CRO of airport Eindhoven. In line of the structure in the literature by Weick & Sutcliffe (2007) an operationalisation of the five HRO principles was
made during the desk research in order to create workable indicators for data collection. See operationalisation scheme in appendix 1. The following indicators were used for measurement in the document analyses and semi-structured interviews. Principle 1 was divided into three aspects: (1) actively searching, detecting and reporting (weak) signals of failure; (2) mutual evaluation of reports and incidents; (3) a reporting culture, in which mistakes are not held against people. Principle 2 was also divided into three aspects: (1) nuanced assumptions and a questioning attitude of people in the CRO; (2) a precaution for the hazard of (shared) labels; (3) mutual trust and respect as a condition for a sceptic and questioning attitude towards partners in the CRO. Principle 3 was divided into two aspects: (1) interaction between operational actors in order to have a clear understanding of the mutual deployment; (2) a less rigid and stiff command and control that has courtesy towards working out of line or rule deviant behaviour on the condition it remains responsible. Principle 4 was divided into three aspects: (1) the experience of strain either through real-time events or multidisciplinary training in order to improve response repertoires; (2) flexibility of the organization to bounce back from setbacks and findings ways to improve it; (3) learning and growing of the organization by learning from mistakes and exploring new challenges or methods. Principle 5 was divided into two aspects: (1) a downward deference in order for managers to know what is happening on the work floor; (2) value the influence of expertise over hierarchy so decision making is done by the most qualified. The posed indicators are used for structuring the analysis, so they coincide with the titles of different subchapters in the analysis.

**Document analysis**

The second method of data collection is document analysis. This is also known as documentary research or -analysis, but in this research only the concept document analysis will be used consistently. Document analysis is the use of external sources, such as policy documents, to make a comparison for support (or contradiction) of the argumentation in academic literature (Verhoeven, 2010, pp. 129 - 130). Two policy documents of airport Eindhoven were used for analysis, namely the CBNP (version 2.1, 2015) and CBP (version 1.0b, 2015). These two documents are the leading documents in case of incidents or crises at the airport. Because the existence and content of documents that involve predetermination (i.e. planning and expectations) is problematic, these documents were scrutinized in light of HRO theory. The analysis was done by using argumentation from HRO practitioners and comparing this to the CBNP and CBP.
As mentioned in the introductory chapter the CBNP is the tactical response plan for internal use on the airbase in case of emergency, both for aerial and non-aerial circumstances. The CBP is the leading strategic response plan in case of crisis situations that require a multidisciplinary approach. Regarding the size of the content, the CBNP consists of 213 pages and the CBP of 45 pages. The CBNP is divided into 8 sections. The first two sections describe the organization and the goal of the plan. The four middle sections explain the working of the KL\textsubscript{u} emergency organization, the alarm procedures, special plans that require additional attention and the appendixes. The final two sections are the initial working parts during incidents or crises and are called ‘tab actielijsten voorvallen’\textsuperscript{8} and ‘tab takenlijsten organisatie’\textsuperscript{9}. The tab actielijsten voorvallen describe 15 different aerial and non-aerial scenarios and give short instructions to the most important actors. The tab takenlijsten organisatie provide short instruction to specific parts of the crisis organization such as the ROT and Gemeentelijk Beleidsteam\textsuperscript{10} (GBT). The CBP has a different structure compared to the CBNP. The CBP has four sections: an organizational part, described scenarios, appendixes and an operational part. It describes three scenarios (i.e. (expected) airplane accident, infectious diseases and hijacking / hostage). The operational part contains the

\textsuperscript{8}English: Tab action lists occurrences
\textsuperscript{9}English: Tab task lists organization
\textsuperscript{10}English: Municipality Policy Team
coordination map with specific details for airport Eindhoven, schematics for standard deployment numbers in case of an incident and instructions for special circumstances. The CBP merely describes the first phase of an incident, which is alarm, upscaling and deployment of units (VR, 2015, p. 6). More information on the documents will be provided throughout the analysis of the five HRO principles.

**Semi-structured interviews**
The third method of data collection is semi-structured interviews. The advantage of semi-structured interviewing is that questions and answered are scheduled, but not limited to the schedule. Therefore questions that are not included may be asked whenever the interviewer feels the need for collaboration on specific details on the topic (Bryman, 2012, p. 471). Taken into account the division of sub-units for observation, the interviews were spread over the different units so that both the managerial and operational level received attention. A total of 10 interviews were conducted. The list of interviewees named by organization and function is added in the quote book in appendix 4. The interviews were conducted in Dutch language, because Dutch is the mother tongue of every person in the CRO. By speaking in mother tongue the interviewees feel most comfortable and are likely to express themselves better. The in-text quotes have been translated into English. Possible translation mistakes could have been made, yet this is not expected to create bias for the research. Interview questions were inspired by the HRO auditing format by Weick and Sutcliffe (2007) in chapter 5 if the book ‘Managing the Unexpected: Resilient Performance in an Age of Uncertainty. Second Edition.’. Furthermore questions have been edited to match the research goal, so the actual questions are based on multidisciplinary resilience. With the use of an interview guide, which is a list of questions or specific topics that need to be covered, the CRO participants were interviewed. See Appendix 2 for the interview guide. Before the interviews were conducted the respondents were send an information sheet via e-mail called ‘informed consent’, see appendix 3. The e-mail was send at least a week before the interview date. The informed consent gave the interviewees practical information about the research, its goal and the treatment of collected data. Furthermore it gave the respondents background information on the topic of HRO and a link to a website with extra information so that they could prepare themselves on the topic.
Data analysis
The collected data needs to be analysed in order to make understanding of the information. In this research a deductive approach was used based on the theoretical framework of chapter 2. The deductive approach represents the most commonly used method in research and uses a predetermined theoretical framework to analyse the found data, thereafter the findings will be confirmed or rejected considering the theory (Bryman, 2012, p. 24). The two policy documents and the narrative data from the interviews were analysed by using the five principles according to HRO theory. Throughout the interviews the structure of the five principles was used in the same order.

Analysis model
The analysis model is a simplified illustration of the research. It shows the organizations that took part in this research and the officials that were interviewed. Some of the squares in the model are red because these functions don’t exist in the CRO or are deliberately not selected for interviewing. On a side note this model is merely a simplification, in reality not all of the functions of CRO officials can be split in either management or operational level because it is possible to work in both.

![Figure 5: Model of analysed officials of the CRO.](image-url)
Validity and reliability
This chapter explains the validity and reliability of this case study. These criteria are appropriate to describe the case study because it helps to understand the purpose of the research and the meaning of the drawn conclusions. Validity is the concept to establish whether the research has met all the requirements of scientific research. It questions if the research shows what it needs to show. Validity is divided into internal and external validity. The internal validity describes if observations match the theory, thus if the observations have any sign of the posed indicators from the theoretical framework. Since this research is a case study which shows unique features of the case, this is known as the idiographic approach (Bryman, 2012, p. 69), it is not concerned with generating statements that can be applied outside of this case. So the internal validity is likely to be high and the external validity is likely to be low. That is to say the theory and observations in this case will probably find a unique match which is not meant to be used for generalisations outside of the case.

The reliability can also be divided into internal and external reliability. Internal reliability means there has to be an inter-observer consistency. This is of no concern to this research because the observations are solely done by the student himself. Only when more than two people are doing observations it is necessary that they understand concepts the same way. External reliability is also known as the replicability of the research. Therefore a complete, clear and understandable process of the used methodology has to be described in order for other researchers to replicate this research.

Limitations
This research was limited by the number of interviews that was feasible for the master thesis. Not all organizations of the CRO according to the CBP were involved in the semi-structured interviews. Due to the time and size of a master thesis it is not feasible to let every stakeholder of the CRO participate in interviewing. This limits the internal validity because not all the perceptions of the users of the CBP are heard. For example the Police and KMar are increasingly more participating in the CRO because of global issues such as terrorism. Furthermore the findings of this research show a unique multidisciplinary organization that due to its low external validity is not to be used for comparisons with other cases.
Chapter 4: Analysis

In this chapter the analysis is presented, which entails a systematic analysis of the collected data from the document analysis and the semi structured interviews in order of the five principles of HRO. It includes critical evaluation of the interpreted data with the use of statements from the theoretical framework. Before the interviews were held to find the perceived reality of the interviewees, the paper reality according to the CBNP and CBP was scrutinized. If there are specific findings on the CBNP or CBP, the analysis of a principle will start with that, otherwise the CBNP and CBP can be addressed elsewhere throughout the analysis by linking it to the semi structured interviews. The data that was obtained from interviews come from CRO officials from different layers in the organization, thus management, operational and plan or policy making. There is no predetermined order of addressing these organizational layers because the analysis is meant to be a well readable chapter. So depending on the addressed principle, the order of data from the various organizational layers can differ. Throughout the analysis references and quotes are made following the opinion of interviewees which can be found in the quote book in appendix 4.

Principle 1: Preoccupation with failure
The first principle that was analysed in the CRO is preoccupation with failure, which is the organizational ability to search and detect weak signals of failure. Being preoccupied with failure is a pre-emptive mind-set that is embedded in the social and cultural matters of an organization, and therefore has minor appearance in the paper reality of crisis response plans. Mindfulness practice should detect failure in an early stage so the actual crisis plans don’t need to be activated. Despite preoccupation with failure being a form of anticipation, small failures can also exist in the responsive phase of crisis management. The CRO responds to real incidents and does exercises in multidisciplinary training which are followed by evaluations according to the CBNP (Klu, 2015, pp. 24 - 25). In this research preoccupation with failure can address both the preventive and the repressive side of safety.

The CBNP and CBP aim to uphold a quick, adequate and coordinated response of military and civil units. They describe the reactive procedures for effective containment of an incident or crises. Because they don’t contain procedures that relate to preoccupation with failure in the preventive stage, this principle is not completely suitable for document analysis. The
principle mostly focusses on the social and cultural situation of the CRO, more specifically for Vlb EHV because they have a larger role in prevention. For the interviews the principle was divided into three distinguishable aspects. First it starts by actively searching for weak signals of failure, being able to detect these failures and finally report them. Additionally this also counts for ‘almost incidents’ known as ‘near misses’. Of course real incidents and crises also have to be reported but they are less likely to be unnoticed, therefore it is assumable they will be detected and reported anyhow. Secondly the reports and occurred incidents have to be mutually evaluated within the CRO. And the third aspect is the reporting culture, this entails the intrinsically and extrinsically motivation of reporting failure and the avoidance of blaming.

**Actively searching, detecting and reporting (weak) signals of failure**
The first aspect of principle 1 ‘preoccupation with failure’ was researched by asking the interviewees what they do to find weak signals of failure. Searching such signals starts in a monodisciplinary sense. The idea of catching discrepancies in an early stage begins by looking in your own environment, thereafter sharing the findings with possible stakeholders whom might also be affected by them. Especially because other stakeholders might see problems in the environment that others failed to spot. Searching for weak signals of failure is one thing, but detecting is another. According to Reason (1990) failures are most likely to occur by human factors. Therefore it is advised to assess activities that involve the most human contact and ad hoc decision making (Reason J., 1997). This aspect starts by scrutinizing activities at Vlb EHV, followed by the organizations that take part in the CRO.

Operations at airport Eindhoven are on the one side military operated by Vlb EHV, and on the other side civil operated by EA. The operations at Vlb EHV will be explained first. Besides the airport services that keep the airfield running (e.g. ATC, meteorologists and bird control) there are also units for military airplane maintenance and logistics. After interviewing officials at Vlb EHV, a general view can be outlined on the organization related to searching, detecting and reporting weak signals of failure. Respondent D (KLu Operations and Coordination), who is a liaison on behalf of Cdo KLu during crisis situations, explains that the core business of Vlb EHV is to be resilient, which is strongly related to the CRO. Whether it is refugees on Lesbos, a terrorist attack in Paris or a crisis like MH17, they have to able to act immediately (D1.1). The notion of discriminatory detail is essential in daily operations, because if one airplane part is missing, other flights can be affected by such a
failure (D1.2). It is very important to look critical towards the small things, because they can have a big impact (D1.3). If unusual things are detected they need to be reported in the organization. Vlb EHV uses a computer information system called ‘Peoplesoft’. Essentially this system is used for human resources management throughout the entire organization of the Dutch Defence Ministry. Within Peoplesoft there is a reporting tool called ‘Melden voorval'\(^{11}\), whenever an incident, dangerous situation or something worrisome is detected it has to be reported in Peoplesoft. The section KLu Bedrijfsveiligheid\(^{12}\) continuously monitors and analyses reports, and decides if further investigation is necessary. Peoplesoft, as an overarching program, was chosen because it covers a large part of the workforce. Many people have access to Peoplesoft and can use the reporting tool without special authorization. On the question if non-military members of the CRO have the ability to look into this system, respondent F (KLu chief of staff) believes not, because Peoplesoft operates mostly on the preventive stage, to prevent the CRO from being activated, whereas the CRO is only activated when real incidents happen (F1.1). Respondent G (KLu Bedrijfsveiligheid) clarifies that incidents which are followed up by an investigation, also consist of an analysis of the repressive phase. Hence the way of alarming and the following emergency response is also investigated. Findings thereafter will be shared with other partners in the CRO (G1.1). Furthermore respondent H (KLu Airport Services), in his role as head of ATC, states everything that is worrisome has to be reported, that can also be latent conditions or things that give a weird gut feeling (H1.1). Because the flight operations are military operated, the civil operator (EA) only registers failures and near misses that happen on their terminal platform for embarking and disembarking civil airplanes and inside the passenger terminal. Respondent J (EA safety manager) says both Vlb EHV and EA used to register everything that happened on the entire airport, but two information systems for the same area is likely to differentiate and create problems (F1.1). Nowadays the military takes care of their own operating area and the same goes for EA.

Besides military and civil flight operations there are also units that focus on emergency response. For example the KLu fire department and civil fire department. These units play an important role in CBP maintenance, because they hold the expertise that plan makers need to make realistic plans. Respondent C (KLu fire department, in his role as On Scene Commander) looks for signals of failure, first in the fire department itself and then places it in

\(^{11}\) English: Report occurrence

\(^{12}\) English: Corporate / Organization Safety
the bigger picture of Vlb EHV. Findings will be forwarded to Bedrijfsveiligheid who report externally towards the CRO (C1.1). The KLu fire department is ‘first responder’ to airplane incidents and is equipped with ‘E-one Titan Crashtenders’. Crashtenders are special firefighting trucks meant for airplane fires. Depending on the scenario also the civil fire department can be alarmed and requested to assist in the CRO. Respondent B (Civil fire department) is the leader of all firefighting units when the CBP is activated; this includes the military firefighting units. He is a specialist in plan making for the CBP and tries to make all plans workable for the civil fire department. A lot of time and energy is invested in the cooperation between the military and civil fire department, says respondent B. From the Hercules disaster many lessons were learned, such as the divided structure between military and civil firefighting. At the time of the disaster it was not clear who was in command (B1.1). To prevent reoccurrence of such an event the fire departments cooperate during real incidents and training which will be addressed in another principle.

Actors on the policy level also need to have an active attitude towards weak signals of failure, because they are usually in the position to take a broader view on the organization. Some of the weak signals of failure that are not visible for people who work in daily operations, might be visible for people who work in the policy level (Weick & Sutcliffe, 2007, p. 48). People on the operational level are more likely to create a tunnel vision because they are bogged down in today’s thinking, whereas non-operational people can take a step back and see different things. According to respondent A (Policy Advisor Crisis Management of VR Brabant Zuidoost), who has the leading responsibility in CBP maintenance, the CRO is continuously looking for disturbances and failures (A.1.1). Within the multidisciplinary environment the CRO analyses incidents and exercises, and checks whether the CBP needs to be revised or the implementation needs restructuring. But challenging in the multidisciplinary environment is the decision of sharing weak signals, as respondent A argues: “[…] how bad do you think it is, and to what extent do you think it is worth to discuss a weak signal of failure. That can be difficult sometimes.” (A1.1). Understandably is the willingness to share as much as possible and also a reluctance to share things that do not matter much since it can create an overflow of information. Furthermore the CBP is only active with the following scenarios: airplane incident (i.e. standby call, ground incident or crash), hijacking/hostage or inflectional disease is enforced by ATC (VR, 2015, p. 15). Unfortunately respondent A does not automatically receives a message when an incident at airport Eindhoven happened because he has no obligation or functionality towards the airport. Respondent A explains:
“To be assured of information I have a colleague who takes part in the regularly meetings on the operational level and thereafter informs me. This is a bad fundamental basis to get failures clear on paper and a bad way to secure information in the organization.” (A1.2). To that end there are two ways policy makers get insight in failures of the CRO. The first way is the non-urgent way, in which failures get brought up in multidisciplinary meetings. The second way is the urgent way through scenarios described in the CBP. Respondent E (Municipality Eindhoven) adds that all GRIP related incidents are monitored in LCMS (Landelijk Crisis Management Systeem13)(E1.1). By monitoring LCMS policy makers can search the multidisciplinary communication for failures, in order to improve the CBP.

**Mutual evaluation of reports and incidents**
The second aspect of principle 1 ‘preoccupation with failure’ was researched by looking into the evaluation strategy of the CRO and how it is perceived by the different actors. HROs are somewhat sceptical about evaluations in the way they are performed in ‘less reliable’ organizations. Evaluations can become a ritual dance if an organization does not learn from its lessons and fails to grasp the opportunity for structural improvement. For example after an incident has taken place and the span of attention gradually gets less up until the point there is no attention for learning. The previous aspect indicated the Vlb EHV is searching and reporting weak signals of failure. According to the CBNP, incidents are discussed in the calamities evaluation of KLu, and possible lessons learned will be put into the organization (Klu, 2015, p. 213). Failures and incidents are shared and discussed regularly in the CRO (I1.1) explains respondent I (KLu flight safety), in his role as investigator of flight related incidents. They assemble multiple times per year for consultation which is done on three different levels. There are meetings on the executive level, the middle management level and the operational level. The executive level, also known as the director level, meets on average 2 times per year (E1.2). The middle management level, also known as the coordinator level, meets at least 4 times per year. And the operational level meets regularly although this is usually not for scheduled consultation but for incident response or mutual training. Also the relatively small incidents that occurred without harmful consequences will be evaluated during meetings (A1.3). Bigger incidents or crisis type situations that lead to activation of the CBP and GRIP upscaling will be evaluated, sometimes immediately after the event, otherwise at the next scheduled meeting. Respondent H (KLu Airport Services) states Vlb EHV is a resilient organization when it comes to responding to incidents, whereas the

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13 English: National Crisis Management System
downside of this is that the organization quickly returns to the daily operations, and lessons learned might not come back into the organization. He thinks of the mutual evaluations as being fragmented, thus at first there is attention after the recent incident, but eventually the attention babbles away (H1.3). Respondent D (KLu Operations and Coordination) says the most crucial process in a mutual crisis response is the handover of responsibilities between military and civil actions (D1.4). A lot of evaluation takes place about this process because people want to do it right. For instance a very important issue, with light on the Hercules disaster, is the correct handover of ‘persons on board’ (POB) lists (D1.5). The next paragraph is a short example of a recent incident at airport Eindhoven that was mentioned by multiple interviewees for illustration.

The Cessna incident
Throughout the interviews with multiple officials of different organizations in the CRO, references were made to a recent incident at airport Eindhoven. This incident involved a small type Cessna airplane. A brief explanation of this incident is given in order for the reader to have understanding of the situation. The explanation is merely meant for illustration of learning efforts of the CRO; therefore specific details are not mentioned. On the 2nd of March 2016 the Cessna was about to take off from airport Eindhoven when it blew two of its rear tires and got stranded on the airstrip for several hours, this resulted in the delay of multiple flights from EA (Omroep Brabant, 2016). The incident had a structured layer of lessons learned said respondent H (KLu Airport Services). Multiple things went wrong in the aftermath of the incident (H1.2). The incident was recognized relatively late because ATC thought the pilot only aborted the take-off without further implications. The head of ATC (who was in a hangar) was called and informed about pieces of rubber on the runway, thereafter the scenario ‘ground incident’ call was made. Vlb EHV made a mistake by not informing the VR and civil fire department. Although the incident didn’t have any consequences that would require a mutual emergency response, it was not according to procedure considering that the VR had to be informed. Respondent F (KLu chief of staff) stated the failed inform-call was investigated and discussed with the civil fire department. The investigation evaluates whether all steps of the incident response were done correctly, if the correct parties have been informed and (when informed) if the emergency responders are in time. Hence there are lessons identified and lessons learned resulting in the modification of procedures at the KLu fire department (F1.2).
After the Cessna evaluation, a problem was identified between the structure of the KLü fire department, specifically for the role of centralist, and the response plan. Because the checklist they used was not in line with the CBNP. According to respondent G (KLü Bedrijfsveiligheid) a new structure is currently being developed within a new computer system which should lead to a better synchronisation between KLü centralist procedures and the CBNP (G1.2). Respondent C (KLü fire department) added there was a problem in communication between de OSC and the KLü centralist due to differences in interpretation. The OSC at the scene analysed the incident and informed the centralist by saying “everything is under control”. In such manner that the centralist forwarded the message to the VR centralist, adding further help was not needed. In hindsight the OSC meant the incident was under control because there was no direct harm involved (this relates to the sharing of labels which will be explained more thoroughly in principle 2). Anyway the alarm call at the VR centralist was stopped, so no further officials of civil partners (for example the mayor of Eindhoven) were informed. Yet it took only several minutes for the incident to be reported on internet and social media (C1.2), understandably this surprised the civil partners. In conclusion policy makers of civil organizations involved in the CBP are dependent on information from the airport. But not all information is worth sharing and finding a balance can be rather difficult. Respondent E (Municipality Eindhoven) stresses the CBP is about (expected) airplane incidents, hijacking and inflectional diseases. So other issues that only have an impact on a monodisciplinary organization, he does not need to know (E1.3). Respondent A (VR) adds: “multidisciplinary stops were a problem in the own organization needs to be adjusted, but of course organizations are expected to give feedback.” (A1.4).

Thus far the preoccupation with failure in the CRO does not seem worthy of sharing weak signal of failure, general perception seems only to value the bigger issues according to CBP scenarios. The next aspect is about the reporting culture.

**Reporting culture**

The third aspect of principle 1 ‘preoccupation with failure’ entails the culture of reporting failures. The main idea is that people need to feel safe to report failures or incidents; otherwise they will not report them or might even try to cover them up (Weick & Sutcliffe, 2007, p. 50). A monodisciplinary reporting culture mostly entails failures in the preventive stage, and the multi culture entails failures in the repressive stage of an emergency response. After the interviews at Vlb EHV, thus in a monodisciplinary sense, a general impression is outlined showing an open culture for reporting failure and a tolerance for criticism and
discussion. Although Vlb EHV is a traditional hierarchical organization, respondent H (KLu Airport Services) argues the KLu is getting more horizontal, which is a better condition to get a clear view on bottom up signals that come from the operations (H1.4). He believes the traditional perception of ‘I will get punished or blamed’ has changed into a reporting culture. Both respondent H and respondent F (KLu chief of staff), claim to be approachable leaders, with an open door for every man or women (H1.4)(F1.3). Respondent F adds that even when issues or failures are very personal, people will still report them and put the organizational interests up front (F1.4). KLu also motivates and rewards people in the reporting of failure. On a monthly basis the KLu squadron for airport services (i.e. ATC, fire department, bird control, and meteorologists) write the ‘safety flash’. A safety flash is a report written by an operational employee describing organizational failure and incidents. They are meant for learning and maintaining a safety awareness, thus not for blaming (H1.5). Vlb EHV also stimulates the reporting culture extrinsically by rewarding employees when they found a flaw or failure that contributed to safekeeping of overall operations. The reward is a certificate called ‘Beste Beurt’¹⁴ and is meant to give publically positive attention to the employee. Despite motivating through rewarding, respondent F mentions there is a strong intrinsic motivation at KLu, because the aircrews that work on the airplanes also have to fly with them. Therefore if something is not right, they are endangered themselves. It makes the motivational perspective easier because you don’t have to explain the importance of safety (F1.5).

A blame-free reporting culture allows people to freely express themselves and scrutinize work patterns and routines. This is a positive aspect HROs promote. Nonetheless discussions can arise due to differences in interest between people or organizations. This often involves differences in power relations, which is closely related to decision making of leadership. According to S. Bacharach, P. Bamberger & B. Mundell (1995) leaders with less power tend to use the logic of tactical justification, hence focussing on short run goals and ‘keeping with past practice’, whereas leaders with more power are likely to focus on long term organizational goals (Bacharach et al., 1995). This theoretical approach can be used to pose understanding on a discussion at Vlb EHV about differences in interest between units of operations and logistics. The former being airmen (or flyers/pilots) and the latter being maintenance crew. Respondent F (KLu chief of staff) explained the discussion between both

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¹⁴ English: ‘Outstanding Action’ or ‘Nice Move’.
units by providing an example of a logistics officer who used the ‘Swiss cheese model’ to illustrate his few on the discussion (the Swiss Cheese Model was explained earlier in the theoretical framework).

Discussion between operations and logistics

At Vlb EHV there are different interests between operations and logistics. Operations consists of airmen who’s raison d’être is to fly airplanes. Logistics consists of mechanics that need to take care of airplane maintenance. Assumable is that both parties want to perform their tasks in the best possible way, so airmen want to fly and mechanics want to do maintenance. Unfortunately the difference in interest can be conflicting because an airplane cannot be in the air and on the ground at the same time. When an airplane does not have any complaints, it is ‘safe’ to fly and airmen perform their operations. When an airplane has a minor technical complaint (at Vlb EHV known as a green complaint) it is advised to be grounded for maintenance, but in case of urgent operations it is still characterized as safe to fly. A major technical complaint (at Vlb EHV known as a red complaint) does not allow the airplane to fly, and maintenance is required first. Respondent F describes the situation of the logistics officer who used the Swiss Cheese Model to explain the problem of stacking green complaints. He said: “It is about the amount of green complaints. They are being reviewed one by one. Yet the sum of ten green complaints might be worth equal to one red complaint.” (F1.6). By taking in consideration what Weick and Sutcliffe (2007, p. 47) said: “The longer problematic conditions persist, the less predictable and controllable system interactions become.”, therefore it is a rational decision of the logistics officer to bring up the issue. The argument of the officer resulted in further discussion at Vlb EHV and a review by KLu Command. It shows the organization is open towards criticism and discussion. Coming back to the theory by Bacharach et al. (1995), it is arguable that units of the distinctive departments (operations and logistics) were led by the logics of tactical justification. Focussing on their own departmental interests and trying to keep going with current practice, yet higher command pursues the organizational goal by taking into consideration both interests and making a decision based on the logic of strategic justification which strives for the continuity of flight operations in a safe environment. The actual result of the decision is not mentioned because due to confidentiality.
In light of HRO theory, managers must be comfortable asking employees about the risks and possibility of unexpected errors in order to create awareness of vulnerability (Weick & Sutcliffe, 2007, p. 151). Respondent G (KLu Bedrijfsveiligheid) states that organizations within the CRO certainly dare to show their vulnerability. During evaluations of failures or incidents people are willing to explain personal experiences while being open and honest about it (G1.3). A reference to the Cessna incident was made in which the OSC openly told the misinterpretation was due to a communication error made by him. That is to say the centralist was not to be held accountable for the failure. On the policy level, respondent E (Municipality Eindhoven) says the coordinators of organizations in the CRO have good ways of finding each other. During the scheduled meetings there is an open culture in which people speak without a high threshold or struggle, and people coordinate with close ties (E1.4). When it comes to evaluating a multidisciplinary training of the ROT or CoPI, respondent A of the VR argues people are actually too kind to each other. He says organizations in the CRO are badly capable of criticising each other, whereas it is okay to tell when for example someone made a minor contribution (A1.5). There are examples of occasions in which a person did not share information that later had an influence on decision-making. The reason why respondent A finds this bad is (among other things) the few contact moments between people in the CRO (A1.5). That is why people don’t know each other well enough to be critical without being rude. This circumstance will be addressed more thoroughly in principle 3 and 4.

**Conclusion principle 1**

The CRO is preoccupied with failure in a sense that organizations are actively searching for weak signals of failure, starting in a monodisciplinary way. Vlb EHV tries to detect small signals failure by promoting an open culture without the occurrence of blaming. This is shown by their efforts to intrinsically and extrinsically motivate the workforce and providing them with an easy reporting tool that can be used by the entire organization. So not only incidents are reported but people are also urged to report near misses and weak signals that show vulnerabilities in the organization. Yet there is a difference in non-urgent operations and urgent operations. Non-urgent operations relates to detecting small failures that are often specific for a monodisciplinary organization, whereas the urgent operations usually entail emergencies or incidents that require the multidisciplinary response of the CRO. The organizations in multidisciplinary sense are not very interested in knowing each other’s small signals of failure. Organizations merely want to mutually evaluate failures if they have an
impact on the CBP. So the non-urgent operations of airport Eindhoven are not of interest for plan makers of the CBP. Despite the plan makers’ opinion that small signals of failure are less relevant, the CRO appreciates the multidisciplinary meetings. There is an open culture with wide possibilities to share information. And even though the sharing of small signals of failure might often just be caused by a weird gut feeling, there could be situations in which sharing a small signal of failure does have an impact on the CRO. For example when someone from a different organization in the CRO detects another problem that is relevant to the topic. In any situation it is important to create and maintain an error-friendly learning culture that allows people to talk freely about errors. An interesting HRO catchphrase to stimulate the reporting culture is: “No news is bad news.” (Weick & Sutcliffe, 2007, p. 152).

**Principle 2: Reluctance to Simplify**

The second principle that was analysed is reluctance to simplify. According to Weick & Sutcliffe (2007) simplifications are somewhat dangerous because they can take away the attention to what happens in reality. A way to counteract simplifications is to be mindful and pay closer attention to context, yet it is inevitable to ignore the act of simplifying (Weick & Sutcliffe, 2007, p. 53). The act of simplifying is twofold; there is a positive and a negative side. The positive side is that simplifying keeps people focussed on key points, it creates order and predictability in organizations. Organizations make simplifications by describing possible scenarios and using them as an example for writing procedures and instructions. The negative side of simplifying is that it might restrain people from seeing beyond what is written, therefore creating blind spots in an organization. Before focussing on the perceived reality of the interviewees, the document analysis shows some remarks on the paper reality of the CBP and CBNP regarding simplifications.

**Simplifications in the CBNP and CBP**

As was mentioned in the methodology chapter, the CBNP and CBP provide the users with short instructions based on predetermined scenarios or specific parts of the crisis organization. In view of HRO theory the existence of ‘short’ instructions already indicates a resistance to oversimplification. The following remarks were made starting with the CBNP. The tabs (i.e. ‘Actielijsten Voorvallen’ and ‘Takenlijsten Organisatie’) are short and concise, generally one or two pages, and provide to the point instructions. They consist of a simple overview of key points and phone numbers that should not be forgotten. By not describing extended plans of action, the CBNP forces the user to think of the best action necessary while
alerting them on a few reminders. Most of the instructions are related to communication, for example the passing on of the number of persons in an airplane or building. Thus no specific tactical instructions (e.g. how to extinguish a fire) are given, because those actions belong to the specific education of people. Moreover such actions are mostly triggered by instinct so people wouldn’t use such specific plans or procedures in such urgent situations. Since the CBNP is used internally, it is likely that the specific terminology and abbreviations are known to most of the users at Vlb EHV, the same cannot be expected for the CBP. The CBP as a top document has a leaner format, and merely focusses on scenarios that require a multidisciplinary response. It describes the first phase of an incident: alarm phase, upscaling according to GRIP, and standard deployment of units. In the CBP it is stressed that monodisciplinary tasks, responsibilities and procedures are not part of the plan. The unwillingness to capture more information beyond the first phase of the CBP indicates that people need to use their own mind to get aware of the situation. The actual operational actors need to get to the location of the incident or crisis and assess the situation. The next part is about the perceived reality by the users of the CBNP and CBP.

The principle was divided into three aspects in order to structure the interviews. The first aspect is about nuanced assumptions and a questioning attitude, thus whether people assume information without nuancing while preserving a questioning attitude. Second is the hazard of having (and sharing) labels. People in organizations develop labels which is a certain terminology of words and abbreviations that is often context specific. If terminology is used in a multidisciplinary environment it is important that everybody understands it the same way, otherwise miscommunications happen. The third aspect is mutual trust and respect, which is needed in order to be sceptic towards one another and assume things from each other.

**Nuanced assumptions and questioning attitude**

The first aspect of principle 2 ‘reluctance to simplify’ was researched by asking the interviewees about their perception on the CBNP and CBP and the attitude towards the assuming and questioning of people in the CRO. In general people make assumptions to prevent questioning each and everything its existence. In a crisis organization it is necessary to make simplifications in order to stay focused on key points and being able to successfully coordinate activities. So in order to make a crisis response workable and predictable, organizations develop working standards and procedures. Not to mention emergency
responders work under the influence of stress, and are more likely to forget things whilst under pressure. Nevertheless assumptions can either be unshaped or nuanced, whereas resilience lies in the direction of nuance together with a questioning attitude (Weick & Sutcliffe, 2007, p. 12). In order to understand the overall structure and attitude of KL, a brief explanation of military service branches is given.

Within the armed forces of the Netherlands there are differences in the way of structuring and organizing the distinct service branches. Respondent D (KL Operations and Coordination) made a comparison between Koninklijke Landmacht and KL; since there is a difference in the way these branches provide their service. The KL provides its service mostly on the frontline, whereas KL mostly operates from a distance. That makes the army being structured in a way that many things are written down in standard procedures or drills, because when they are under fire there is less room for divergence or discussion. According to respondent D a strong point of KL is that they are flexible because a lot of things knowingly have not been written down (D2.1). “Flexibility is the key to airpower.” (I2.2) is the motto of the air force, stresses respondent I (KL flight safety). He states CRO has a workable crisis response because they ‘keep it simple’. Furthermore he said it is preferable to train people in a certain way to think logically and make wise decisions, because in the moment there is usually is no time to check everything (I2.2), yet there will always be people who prefer a tighter structure with more standardized information and people who prefer the lean approach. The following paragraph explains the way the CBP is structured, and how this is perceived by its users.

According to respondent A (VR) the CBP structure is based on two key points. The first key point is responsibilities, knowledge and expertise of executives. It shows that the task of training and education lies first and foremost at the organizations from a monodisciplinary perspective, so this will not be included in the CBP. The second key point is the unwillingness to write down every possible scenario, because you can describe 100 scenarios and number 101 will take place (A2.1). The CBP only describes the first phase of the CRO, thus reporting the incident, calling the alarm and sending manpower and material. This is all formalized on a standard input of man and material corresponding to the different levels of the GRIP upscaling structure. According to respondent A (VR) there is no need to think about

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15 English: Royal Netherlands Army
the number of units that need to be deployed, since they are formalized beforehand. Of course the deployed units do have to think and be aware of what they see when they arrive at the location. This requires knowledge and expertise, and it prevents the need to describe a big number of scenarios (A2.2). It is clear the CBP is intentionally kept concise and limited. As stated earlier the scenarios: (expected) airplane incident (i.e. standby, ground incident or crash call), hijacking/hostage or inflectional disease are described in the current version of the CBP (VR, 2015, p. 15). In the upcoming updated version a change has been made in the described scenarios argues respondent E (Municipality Eindhoven). The scenario hijacking/hostage will be changed into a general topic called extreme violence, which thereafter is subdivided in hijacking/hostage, explosion, bomb threat, and amok shootings (E2.1). One of the incentives for the new scenario structure was a discussion about differences and overlap in responsibilities of authorities. E.g. the Koninklijke Marechaussee\textsuperscript{16} (KMar) and the Police, because it is not always clear who has the responsibility to act in different scenarios.

The CBP is structured with fixed scenarios that stress the most important issues in the first phase of the CRO. In the heat of the moment, despite having fixed scenarios, respondent H (KLu Airport Services) believes there are always contact moments, for example by the fire department, to adjust on issues and question how things are going. He adds that every organization or department wants to know its role for the CRO and what will be demanded from them, so there is a culture in which people do not take things for granted (H2.1). Respondent H also states: “There is a plan in a thick folder, located on the book shelve and nobody reads it.” (H2.2). He implies too little has been simplified which has a downside. Because people are left to their own expertise they tend to do what they think is best for the situation, but when multiple people act in this way it can be conflicting. If an incident happens there is a lot of fine-tuning and cross-checking by phone calls, instead of sticking to the flowchart according to plan (H2.2). So despite having the different tabs or flowcharts in the plans it seems people don’t assume things easily and have a tendency to ask for information. Respondent B (Civil fire department) is the leader of both civil and military firefighting units when the CBP is activated. He says the questioning attitude of ‘Officieren van Dienst’\textsuperscript{17} (OvD’s) is sometimes intermingled with the different interests of organizations. For example during an airplane standby-call scenario, when a malfunctioning airplane is

\textsuperscript{16} English: Royal Military Constabulary
\textsuperscript{17} English: Officers on duty
inbound, the OvD from the fire department stands together with the OSC. Other OvD’s (e.g. Police, Ambulance or KMar) need to be stationed on another location because the OSC can’t be bothered by too many questions. This causes irritation with the secluded OvD’s because they are no longer able to be informed with new information from the OVD from the fire department or OSC. Although respondent B finds this very annoying, he argues the most important things in a standby call is that the OSC can focus on the inbound airplane (B2.1). This indicates the questioning attitude of operational people the CRO. In order for policy or plan makers from civil organizations to nuance assumptions and question issues there needs to be access towards airport policy, and therefore also the military part. In past times operations at military air bases used to be (to a certain extent) secretive. Respondent G (KLu Bedrijfsveiligheid) states that in the past two years the so-called ‘wall of secrets’ has been taken down, and transparency has been given to the VR and other organizations. He states: “The CRO is there for us, and if we keep everything a secret we can’t expect the CRO to be cooperative in finding solutions for our problems.” (G2.1). It seems people are eager to ask questions in the CRO, which is a good point to counteract the simplifications in the CBNP and CBP. The next part looks into the hazard of shared labels.

The hazard of labels
The second aspect of principle 2 ‘reluctance to simplify’ was analysed by looking for specific labels (also referred to as terminology) inside organizations and thereafter questioning partners in the multi environment about the usage and understanding of these labels. This is an interesting aspect because the CRO consists of both civil and military organizations. The difference might already be a starting ground for problems, because it is likely that organizations in different disciplines use a different language. Words, meanings and habits can differ between organizations and cause misunderstandings. In the theoretical framework the ‘shareability constraint’ by Baron & Misovich (1999) explained that people create strong impressions in their mind when they experience something by direct acquaintance, but when the impression has to be disseminated to other people it will change into labels or categories (Weick & Sutcliffe, 2007, p. 57). When scrutinizing the CBNP for the shareability constraint there is a remark regarding the communication through what is called a ‘Situatierapport’18 (SITRAP) (Klu, 2015, p. 123). When an incident or crash happened the officials who work in ATC and firefighting need to write a SITRAP and forward it to Cdo KLu. The SITRAP is one sheet which contains about 20 points that need to be filled in, such as the type of incident,

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18 English: Situation Report
the scenario and the number of POBs. This has to be done as soon as possible right after the alarm call. In this way the management is informed about the situation (Klu, 2015, p. 41). In light of HRO theory the SITRAP is rather much focussed on categories and simplifications. Understandably this allows the officials to write the report quickly, yet there is little room for writing down a personal experience of the situation. It seems the SITRAP has to be worked down along the 20 points by more or less checking the boxes. There is room to write down particularities, but more important for reliable organizing is that people first and foremost have the possibility to write down the situation and not directly have to start categorizing it, otherwise important details might be forgotten (Weick & Sutcliffe, 2007, p. 57). The next paragraph covers the CBP from a multidisciplinary perspective.

The CBP is a comprehensive document that contains information from various disciplines that participate in the CRO. It contains terms that originate from aviation, crisis management, firefighting, military etcetera. Partly because of this comprehension the CBP touches many legal frameworks and laws from the various disciplines. It also has two pages of abbreviations which implies the necessary effort in order to make sense of the terminology in the document (VR, 2015, pp. 25 - 28). Considering safety regulation of airport Eindhoven one of the most prominent labels in the CBP is ‘Airfield Status Black’. When called off by ATC, airfield status black means that all air traffic on airport Eindhoven is stopped, also ground units are not allowed to enter the airstrip. According to the CBP this term is not used in communication between military and public organizations (VR, 2015, p. 12). Assumedly ATC will explain the situation in other words when communicating with people from for example the VR. Not only people at the airport or military have their own language, also people at the VR have their own way of speaking. The experience of respondent I (KLu flight safety) tells it took him about a year to understand the jargon that is used in the VR. He explains it takes some time to grow into the CRO, and the CBP brings the different languages nicely together (I2.3). According to respondent G (KLu Bedrijfsveiligheid) the entire CRO is still learning when it comes to labels and the problems it might cause. Several table-top exercises on different organizational levels have been done in order to create a mutual understanding of each other’s language and abbreviations. Still there will be risks because you are dealing with different cultures and people simply like to use abbreviations. Nevertheless during training and meetings people pay attention to these differences and try to speak as fully as possible, moreover when people don’t understand they are urged to ask questions (G2.2).
The hazard of labels not only entails a spoken language, it also covers the categories people or policy makers choose as form of simplification. The most relevant example is CBP scenario ‘airplane incident’, which is categorized in three possible options: standby, ground incident or crash call. In past times, explains respondent B (Civil fire department), the CBP only had two options namely standby and crash. The problem that ATC officers ran into was that there was no option between a standby and crash, but if an airplane gets flat tire during a landing or take-off, is it a crash? It is important to realise that when a crash-call is emitted the CBP will be activated together with GRIP upscaling corresponding to the amount of passengers that are on board on the airplane. This resulted in the additional scenario of a ground incident (B2.2). The ground incident scenario now has its own standard deployment of units. Another related example is the military terminology that indicates the different areas where an airplane could crash. The airstrip is zone 1 and is called ‘Crash Alpha’. Zone 2 is the surrounding area of the airport Eindhoven covering several kilometres outside of the airport and is called ‘Crash Bravo’ (VR, 2015, p. 7).

Respondent C (KLu fire department) argues the sharing of labels can be problematic due to the different visualizations of organizations in the CRO. He explains: “If an airplane gets a flat tire on the airstrip, in air force terminology this is a crash alpha. But at the VR this was interpreted as literally a crash in which an airplane has hit the ground. For the world outside the air force the word crash can mean the biggest scenario with fire and everything, inside the air force it can mean something minor as well.” (C2.1). Interpretation differences like the
previous examples play a role in the CRO. During evaluations or meetings there is plenty of time to explain and question each other, but in the heat of the moment it is more important to speak, listen and interpret in the right way. In order to speak the same language and talk the same way, people need to know each other. It is important that people who have an executive role in the CRO regularly meet. Especially the units in the CRO who are deployed rarely, because not much airplane crashes or incidents happen. Therefore it is necessary to formalize meetings such as mutual training in order to actually face each other. As some interviewees liked to call it ‘being with the boots in the mud’.

Respondent A (VR) states confusion of tongues happens everywhere, yet it is important for OvD’s to see one another occasionally, so when there is an alarm call which gets withdrawn, still the OvD will visit the airport for a quick meeting (A2.3). This form of interaction is a valuable point of the CRO, and will be addressed more thoroughly in principle 3. Such interaction moments, although not formalized in the CBP or GRIP, are likely to pay off during real incident scenarios. For the simple reason that people know each other, have regular conversations and are able to find each other quickly when needed. Sometimes the executive officers involved in the CRO just want to have a quick chat and a cup of coffee after a standby call without any further hassle. Generally this is called ‘Motorkap overleg’\textsuperscript{19}, which doesn’t necessarily have to be GRIP related. Some OvD’s are not always positive about the GRIP structure because it is perceived rigid and heavy, also not easy to downscale. Sometimes a minor incident may require the expertise of one OvD, and airport Eindhoven can be willing to reach out for this person without activating the entire GRIP structure. The flexibility of GRIP is being researched by M. van Duin & V. Wijkhuijs (2015) who explore possibilities in applying GRIP more flexibly. Issues such as flexible deployment of OvD’s including easier downscaling are relevant for HROs and might contribute to building a more resilient CRO, because it will be easier to create more contact moments between operational actors. The more contact moments there are, the more time is invested in the creation of mutual trust and respect, which leads to the third aspect.

**Mutual trust and respect**
The third aspect of principle 2 ‘reluctance to simplify’ was analysed by asking the respondents what their opinion is on mutual trust and respect in the CRO. Although this topic can be somewhat sensitive, it is still important to gain insight in this topic because it can

\[\textsuperscript{19} \text{English: Bonnet/Hood Consultation}\]
make or break multidisciplinary cooperation. Trust and respect are necessary conditions for any cooperation to succeed. It creates a welcoming attitude, makes it possible to give and take inter-organizational orders, and allows being sceptic towards each other. Also because actors or organizations with less power or boldness often get less attention. Weick & Sutcliff state: “The people most likely to catch unanticipated warning signals have the least power and argumentative skill to persuade others that the signal should be taken seriously.” (2007, p. 95). This same rule can be applied to organizations in the CRO. Organizations who are more on the side-line can use divergent viewpoints to see a greater variety of inputs. Therefore it is wise to treat the less influential organization with gratitude because they tend to see more.

Before and in the aftermath of the Hercules disaster mutual trust between the civil and military fire department was bad (C2.2), currently the trust is optimal says respondent C (KLu fire department). In present day the civil and military fire department know what to expect from one another, they exercise regularly and have a clear view on the situation. Respondent B (Civil fire department), in his role as leading OvD, agrees that people always treat each other with trust, but further argues that things not always go well during an emergency response. So without disrespect or distrust, you sometimes have to decide and say ‘No’, and then the situation can get very fierce because people might feel offended (B2.3). This relates to the example of the OSC during a standby call, in which all OvD’s except the civil fire department have to stand on a different location.

On the policy or coordinator level things are slightly different because of two main issues. First is the circulation of officials due to consignment in for example the ROT and GBT. Second is the relatively fast job variation in policy functions in organizations. From an HRO perspective both aspects have pros and cons. A proficiency of consignment and job circulation of people that have a role in the ROT and GBP is that it preserves divergent analytical perspectives, because fresh eyes tend to break up fixations (Weick & Sutcliffe, 2007, p. 154). Despite having to do with a greater variety of inputs it can also be counterproductive when having policy teams that change continuously. A constraint is that the continuous circulation and job variation obscures the close ties between people. It can be time consuming in multidisciplinary teams if it always has to start with introductory, and not knowing what kind of person there is in front of you. Respondent J (EA safety manager) thinks it is unfortunate that officials at the Police, KMar or KLu are relatively short on their
position. So it happens frequently that new officials arrive in the multidisciplinary meetings, or that due to understaffing no official is available for a meeting (J2.1). Respondent E (Municipality Eindhoven) in his role as coordinator crisis management can take part in a policy team during an incident or crisis. He states he never experienced anything remarkable, yet in the start-up of a policy team people always need to feel each other and see how things go. The formation of policy teams can be different each time, due to consignment, vacation or illness. For example there are 6 members of the executive board of Eindhoven, plus the mayor. If the mayor is abroad, someone else has to lead the policy team in the first meetings (E2.2). Despite that consignment and job variation may cause an efflux of personal relationships, there is no need to worry for disrespectful behaviour or distrust between organizations in the CRO, after all they are all professionals and know what they talk about.

Conclusion principle 2
The CRO has a reluctance to simplify to the extent that the generally shared idea is to keep the CBP and CBNP in a concise and easy to learn format. The KLu, and therefore also Vlb EHV, has an organizational structure that is built around the notion of flexibility. Historically this means that there is resistance to write everything down in procedures and drills, because the air force needs to be able to respond instantly. So militaries in the air force are used to raise doubts to gain information, which some people might experience as boldness, yet it is a positive point in light of HRO theory by Weick & Sutcliffe (2007, p. 153). Whereas HROs encourage alternative views on situations, the fire departments in the CRO mention that during urgent response actions often there is no time for this, and the authoritative operational leader decides the course of action. Some of the respondents state too little has been simplified, which allows people to do what they think is best, instead of following the predetermined plans. Sometimes this can cause confusion during real time incidents, for example when people use their informal contacts to gain information.

Considering the hazard of labels, there were multiple errors in the past that had to do with crisis communication. When looking at the SITRAP form there might an oversimplification, which excludes the option to disseminate detailed first impressions. Weick & Sutcliffe argue you have to carry categories more lightly, where you both have to believe and doubt the information you receive (2007, p. 58). During non-urgent circumstances such as the scheduled meetings it is possible to raise doubts and ask more questions, but during incidents or crises it is not always possible. Therefore the operational units of both military and civil organizations should have regular contact moments so they can speak with each other and get
used to different terminology and abbreviations. Essentially the same goes for staff meetings because personal interaction builds trust and respect, which allows people to scrutinize each other’s viewpoints. Unfortunately staff people are relatively short in their function which is not good for multidisciplinary cooperation and short ties in communication, thus interpersonal moments are even more of importance. The concept of interaction will be addressed more thoroughly in principle 3.

**Principle 3: Sensitivity to Operations**
The third principle that was analysed is sensitivity to operations; it means the ability to see what it is really going on in an organization. This is contrasted to strategic plans of action which describe what should be done. Since reality is often different from strategic views, it is advised to develop situational awareness in order to see what is really happening (Weick & Sutcliffe, 2007, p. 12). Coming back to the second principle it was already stated that the shared terminology and mutual trust and respect is correlated with the amount of contact moments between actors in the CRO, the interaction between actors is addressed in this principle. In view of this research the principle was divided into two aspects. The first aspect is interaction between operational actors. As mentioned earlier it is important that actors of the CRO actually meet in person so that when a real incident or crisis situation happens they know each other. The second aspect is command and control. This looks whether the organization is based on strict commands and rule compliance or if there is room for deviant approaches provided that it is done in a responsible manner.

**Interaction between operational actors**
The first aspect of principle 3 ‘sensitivity to operations’ was analysed by asking the interviewees whether operational actors have enough interaction to have a clear understanding of the mutual deployment. Despite the importance of plan making, policy advising and management, the work floor is eyes and ears of the organization. As some respondents liked to say: ‘People with their boots in the mud run the operation’. Hence the CRO falls or stands with mutual efforts of operational actors. In light of this research operational actors refers to two sides of the CRO. On the one side there are operational actors in the role of first responders such as firefighters. They are required at the location of the incident or crisis within several minutes. On the other side there are operational actors in the form of multidisciplinary coordination such as the ROT and GBT, in which liaisons inform and advice each other during the coordinated response. Before addressing the perception of
operational actors, the CBNP and CBP were scrutinized on the formalization of interaction moments.

In the formal structure of the CBNP and CBP only the minimal required (multidisciplinary) training or exercises are described, whereas the true power of interaction often lies in the informal contact moments (Weick & Sutcliffe, 2007, p. 59). According to the CBNP there are five distinguishable exercises ranked from level A to E. Level A and B are essentially monodisciplinary exercises of Vlb EHV, whereas level C, D and E are multidisciplinary exercises that also cover the CBP requirements. Level A is a basic exercise of a small part of Vlb EHV, possibly with fellow users of the CBNP. Level B is an extended exercise with multiple parts of Vlb EHV and possibly with fellow users. Level C is a multidisciplinary staff exercise at least once every two years for ROT, GBT and RBT and additional KL u leadership. Level D is a multidisciplinary exercise at least once every four years for staff (ROT, GBT, ROT, and KL u) and operational units on the field and in the CoPI. Level E is a large scale extension of level D, and requires all disciplines of the CRO to take part. Sometimes the large scale exercise can be done simultaneously with level D (Klu, 2015, pp. 24 - 25) (VR, 2015, p. 8). Despite the minimal requirements of the CRO, there are also contact moments during scheduled staff meetings or during real incidents. Such moments are not formalized in the documents but are of great importance for the operational actors. Essentially real incidents are the best form of training, because this is when people are most of the time caught by surprise and need to switch their minds to a state of urgency.

As stated earlier in the paragraph about the hazard of labels, OvD’s of the civil fire department visit the airport after an alarm call, even though the incident might already be cleared. Respondent B (Civil fire department) says he always visits the location, even though there is no incident. He stresses: “[…] just for a cup of coffee, it sounds very cozy but it is very functional. Because if that airplane does crash one day, we need each other to the fullest. And I invest in that relationship, because if it happens I really need those on scene commanders.” (B3.1). The informal interaction is a valuable point according to HRO theory. If such interaction would not take place, the only contact moments will be during incidents or mutual training. Moreover if less minor incidents happen due to improved flight technology, it might just be during training. How the mutual training is organized and perceived will be discussed more thoroughly in principle 4. Respondent C (KL u fire department) confirms the OvD’s visit regularly and understand the expertise that the military fire department has. He
argues that in the beginning of mutual exercises and training both the civil and military actors have to make sense of each other’s intention, but usually the first line of action lies with the military responders because of the extreme fires that airplane crashes often cause. So the military units with crashtenders will do their work first before anybody else can do anything (C3.1). In the next paragraph a short example is given of an airplane crash and the first line of action of the CRO.

The golden (half) hour

The following example is a simplification of a worst case scenario at Vlb EHV. A worst case scenario in general aviation would be a crash somewhere remote where there are no emergency responders in the surroundings of an airport, but this simplified example illustrates a crash on or nearby the airstrip. The scenario is as follows; an airplane hits the ground, catches fire and people on board either die or get wounded. The crash will be highly energetic. Likewise the crisis response phase is also highly energetic, that is to say the first minutes after a crash are the most crucial. There are two ways the CRO can be deployed, firstly through a standby call responders can be deployed before the plane gets inbound, and second through a ground incident or crash call they can be deployed after the incident or crash has taken place. The first way is relatively the safest, because an airplane (assumedly malfunctioning) is inbound while crashtenders, watertenders, ladder trucks and ambulances etc. are waiting next to the airstrip. If an airplane then crashes there should be enough responders on site to take care of the situation. The second way is different and the most dangerous. An airplane is inbound or taking off under normal conditions, but the unexpected happens and it crashes. For example due to a bird hit or wind shear. What then happens is the ATC will hit the crash button and the CRO is gets deployed. The biggest blow comes from the military fire department that will be at the crash site within several seconds or minutes. At the crash site they will probably extinguish the fire within several seconds or minutes. The crashtenders empty approximately 12,000 litre water and foam mixture in one and a half minute (Ministerie van Defensie, 2016). After the fire is extinguished a rescue operation can be started to save survivors of the crash, if there are any.

The upper examples stresses the importance of the first responders in airplane incidents or crashes. The CBP primarily gets activated with an (expected) airplane incident. In secondary
sense also for the scenarios infe\nctional disease and hijacking/hostage, and (in view of the
upcoming updated version) extreme violence. Sticking to the primary sense, an airplane
incident scenario will be called off by ATC, and corresponds with a specific GRIP level. A
standy call or ground incident call corresponds with GRIP 0, which means an
interdisciplinary meeting will be held on the location of the incident. A crash call with a
maximum of 10 POB scales up to GRIP 1, this activates a CoPI for multidisciplinary
leadership. If it is a crash call of an airplane with more than 10 POB, there will be an
upscaling to GRIP level 3 (VR, 2015, p. 16). In theory a GRIP 3 means that the wellbeing of
a big group of people is threatened. This results in the start-up of additional structures in
multidisciplinary leadership, i.e. ROT and GBT. The ROT is responsible for operational
leadership in a multidisciplinary sense and one of its tasks is to translate operational issues to
the administration of the mayor. The GBT, when activated, is the leader of the CRO and
advises the mayor (or its substitute) about the administrative and societal impact of the
incident (Helsloot et al., 2011, pp. 74 - 76). Following the procedures of the CBNP there are
several more action centres that can or will be activated when needed, e.g. Cdo KL\n\u201a Airport Services the CRO is making good steps, the first
responders (i.e. ATC, military fire department) know their roles and what they have to do
when something happens (H3.1). At some point the VR and civil fire department will join the
operational units at the airport. Respondent H is concerned about discussions that will arise
regarding leadership in a multi-environment, as both the military and civil parties tend to
keep a hold on leadership (H3.2). Furthermore he is sceptical towards the GRIP upscaling in
relation to multidisciplinary leadership teams which are off-site, namely at the city centre of
Eindhoven. Since airplane crashes are highly energetic, the first responders will be the
military firefighters and the OSC, probably within an hour the rest of the CRO starts to
become active. By the time a ROT or GBT is settled, it is likely the airplane will already be
burned out or extinguished. He argues CoPI, ROT or GBT need to be deployed at incidents
which are slowly developing, such as fire at chemical facilities, and therefore during airplane
incidents they have less effect (H3.3). Despite the primary goal of airplane safety there are

20 English: Shelter & Care
21 English: Information
also other possible scenarios that might entail a longer period of CRO activation and require off-site multidisciplinary coordination between leadership. But understandable is the wish of coordinative leaders to be present on site where their units are dealing with the situation.

Respondent D (KLu Operations and Coordination) explains there have been changes in the system of responsible officials in the CRO since the introduction of consignment. In the past there were only several primary responsible officials, they held the expertise to enter a ROT or GBT. Nowadays the system is more flexible because for every position there might be 6 possible officials who circulate the consignment scheme. As is stated in the CBNP there are groups for GBT, ROT, CoPI, Cdo KLu and O&V (Klu, 2015, p. 39). This is a challenging development because KLu wants to position people with the same background and expertise, yet not everybody experienced a real incident or exercise, therefore not all the consigned people might have the same expertise. Furthermore militaries that are new to Vlb EHV by chance can enter the consignment relatively quick, which can be problematic. According to respondent D an essential point is to make sure that everybody in the consignment knows where to find each other, because it is all written down in the procedures, but whether people have the practical experience is the main question (D3.1). Next to the concerns about the current consignment scheme, there is also criticism towards the existence of the consignment. Respondent H (KLu Airport Services) argues: “[...] the CRO needs to trust on its resilience, and should be watchful for a false sense of security that a consignment might be. There could be persons consigned to the circulation scheme that have no understanding of the CRO.” (H3.4). He questions if the system of consignment really improves on security, and thinks it is merely a security measure that covers the paper reality (H3.5). With the use of a consignment for operational leadership the organization at Vlb EHV wishes to be more flexible. Yet it is arguable if this will provide the same quality due to the spread of expertise. Nevertheless the consignment has a bigger chance of eliminating a threat to the principle sensitivity to operations, which is a routine (Weick & Sutcliffe, 2007, p. 61). This will be addressed in the next aspect command and control.

**Command and control**
The second aspect of principle 3 ‘sensitivity to operations’ was analysed by looking at the command and control of organizations in the CRO and scrutinize its rigidity. HROs favour less stiffness in the command and control of organizations, and allow for rule deviant behaviour on the condition that the deviance is responsible. Furthermore there is the tendency
of routine jobs to become mindless jobs; therefore variation in approaches can promote mindfulness. The interviewees were asked how the organization reacts if people solve problems that are not included in their job description or are not according to standard procedure.

Command and control is embedded in organizations and usually follows a structure that has been around for a long time. The environment in which organizations operate is dynamic. Societies change under the influence of innovation and development. Organizations also change, for example its social and cultural aspects. Respondent F (KLu chief of staff) in his role as Deputy Commander of Vlb EHV shares their philosophy: “Mission first, safety always.” (F3.1), which resembles an organization with a determination towards the goal while operating in a safe environment. This exceeds the popular ‘safety first’ principle because that one suggests safety is merely an aspect in the beginning, whereas is should be upheld at all times. The command and control of KLu is changing due to reorganizing through social and cultural innovation in the ‘CLSK 3.0’ program. This 10 year reorganization program spearheaded trust and ownership for the workforce (Klu, 2013). The commanders at KLu are stimulated to treat their units as professionals with more room for trust and ownership (F3.2). These two factors are likely to smoothen some of the strictness in the command structure of Vlb EHV. This means that people are allowed to make more decisions themselves which puts less pressure on superior officers. This should lead to more differentiation and innovation in problem solving. In the CRO different approaches to problem situations are not only acceptable, but also appreciated and sometimes necessary. In what is called the ‘warm’ side of the CRO (e.g. firefighting), people share characteristics of goal determination and flexibility. To that end firefighters will make their way to the goal whatever the cost. Respondent C (KLu fire department) says: “If we can’t go right, we’ll go left. Or else through the top or bottom, but we will solve it.” (C3.2). He argues it is in the nature of a firefighter to improvise, if there are problems they will come from the ‘cold’ side (policy level), though at a later stage because in the heat of the moment there is no time to say no (C3.2). Respondent B (Civil fire department) makes a further comment by stating procedures are not set in stone. There is the option to deviate, but you will have to explain yourself later. During emergency responses there is no time for discussion; therefore some people get surprised if your actions deviate from standard operations. But in the end there are clear rules of what is allowed and what is not, yet there are always exceptions (B3.2).
Respondent A (VR), in his role as CBP plan maker, states deviance is allowed if can be accounted for. The VR looks critical at reasons why people did not act according to procedure, because procedures don’t arise out of nothing. It is based on earlier incidents and cooperation. Essentially it is inevitable to always work according to the same method because different organizations have different structures, so there are natural limitations (A3.1). Deviancy can also be a sign that the procedure or plans are not written correctly. The VR relies on information from the CRO. Respondent A argues there is too little information exchange between organizations in the CRO. He thinks organizations should think more ahead during incidents, asking themselves what the situation means for their own organization and of course also for other organizations in the multi environment. As well as for the plan makers in the CBP, because too much information has to be requested, whereas the CRO can work faster if people would bring more information (A3.2).

**Conclusion principle 3**

At airport Eindhoven not many incidents happen that require activation of the CBP, so face to face contact moments between operational actors in the front line are valuable and possibly a key to future success. According to Weick & Sutcliffe face to face contact could be the richest source of discriminatory detail because it allows people to express themselves to the fullest with direct opportunity for feedback and lesser chances of miscommunication (2007, p. 155). On the warm side of the CRO there is confidence about the operational interaction. In the next principle an example will be given about exercising during airstrip maintenance in May 2016. They wisely make use of the opportunity to do mutual exercises. On the cold side there is concern regarding the expertise of consigned KLu officials (e.g. ROT or GBT) due to the amount of people whom are scheduled and the moments they are actually deployed. Furthermore there is criticism towards ROT and GBT consignment because of the high energetic scenarios airplane incidents often entail. Yet the scenarios are not limited to airplane crashes therefore multidisciplinary coordination in the centre of Eindhoven could still be needed. Considering the command and control of the CRO there is encouragement for people in taking ownership of problems and find ways to solve them. Deviancy from plans is allowed if responsible, which is a common understanding of people who work in the air force or in firefighting. Plan makers respect this way of mindful operating, but face a dilemma since the policy level is more bound to rules and compliances. Furthermore they are limited to the time they can invest in being in the front end of operations of airport Eindhoven, since the airport is not the only organization that requires attention of the VR. Weick & Sutcliffe
logically reason that being close to people in operations is a win in the development of sensitivity towards operations (2007, p. 156), but plan makers in the CRO argue the operational actors should contribute by thinking ahead and questioning what impact their operations might have on the other organizations in the CRO. Instead of going to the work floor and ask information, the plan makers wish to receive more in a bottom-up structure.

The first three principles that were discussed are of anticipatory nature. As stated earlier they relate to the preventive stage of dealing with unexpected events. The remaining two HRO principles focus on the containment of unexpected events, which mostly relates to the reactive part of the CRO. Thus after an incident or crises happened.

**Principle 4: Commitment to Resilience**
The fourth analysed principle was commitment to resilience. Based on the assumption that unexpected trouble is inevitable, it is important that the CRO can recover from setbacks. An incident or crisis needs to be contained by attempting to prevent the situation from worsening. In this research principle 4 was divided into three aspects. The first aspect is multidisciplinary training. A single organization can be very well prepared for an incident or crisis, yet the multidisciplinary cooperation requires a mutual preparedness. The entire CRO can fail if one organization or unit malfunctions. The second aspect is flexibility, and looks at the organizational capability to adopt new working conditions or changes in response plans. The third aspect is learning and growing. Due to the influence of global security issues and demands of stakeholders, the CRO needs to learn and grow in order to uphold resilience.

**Multidisciplinary training**
The first aspect of principle 4 ‘commitment to resilience’ was analysed by on the one hand looking at the frequency of multidisciplinary training as described in the CBNP and CBP, and on the other hand asking the interviewees what their opinion is on the frequency and content of current multidisciplinary training. Furthermore an interview question was aimed at the knowledge and skills of the CRO, because HROs encourage the development of response repertoires. As was explained in the previous principle, the CBNP and CBP have a minimal requirement for multidisciplinary training. Essentially there are two types of multidisciplinary training. A multidisciplinary staff exercise once in two years, in which the CBP will be tested on correctness, completeness and usability. And a multidisciplinary staff plus operational
units exercise once in four years. During these exercises also the CBNP and the calamities plan of EA will be practiced (VR, 2015, p. 8). In the CBP no statements are made on the form or content of the exercises. Considering the CBNP it was mentioned in the previous principle that monodisciplinary smaller exercises can be conducted with fellow users of Vlb EHV. In a sense such exercises can also be characterized as multidisciplinary if the fellow users are also part of the CRO. Such exercises can be done relatively faster because they require less capacity of the organizations. The VR is the leading plan making organization of the CBP and is addressed first.

Respondent A (VR) his view on the multidisciplinary training is as follows. The current line of action of CBP plan making is running for four years. As stated earlier the format that is being used is concise and limited, which makes it easy to learn (A4.1). In the beginning it is a standard format that can be applied to different kind of organizations. The standard format is accompanied by a coordination map, that contains specific details and focus points of an organization, in this case airport Eindhoven (VR, 2015, p. 30). Respondent A argues multidisciplinary training sticks to the scenarios and plans that are available in the CBP; due to a lack of capacity the mandatory trainings are usually done by table-top exercise or small operational training (A4.2). In general Vlb EHV is more intrinsic motivated to do real exercises, and therefore multiple officials believe more operational training is needed (I4.1)(G4.1). Respondent I (KLu flight safety) argues the VR is satisfied with a table-top exercises, but Vlb EHV wants to do real exercises, thus being with boots in the mud (I4.1). Although the aspiration of more operational exercises is widely shared in the CRO, especially because not much real incidents happen, there is also understanding of the lack of capacity. Respondent G (KLu Bedrijfsveiligheid) argues multiple coordinators of the CRO are concerned about the repeating choice for table-top exercises. Because during a table-top exercise the communication lines are represented by a list of phone numbers, but you will never know if it will work properly and whether people actually respond (G4.1). Moreover experience shows that during crisis situations many people make use of informal contacts to gain information about the situation. Such things are not written down in procedures and therefore will probably not be taken into account during table-top exercises.

Respondent E (Municipality Eindhoven) argues the VR is always willing to think along with the CRO, despite their willingness to fully cooperate, they also have to focus on other crisis plans of other organizations and the minimum efforts it requires. So it is mostly a matter of
incapability. Nonetheless he believes the operational organizations in the CRO can organize their own multidisciplinary training without the presence of administrative organizations such as the VR. For example the civil and military fire departments can organize exercises together (4.1), which is actually being done. On the 30th of May 2016 airport Eindhoven was closed for two weeks due to airstrip maintenance (NOS, 2016). According to plans this moment will be used by both fire departments for multidisciplinary training. According to respondent C (KLu fire department) the military and civil fire departments invest enough in multidisciplinary training, they have regularly meetings and joint exercises. But in his role as member of the ROT he believes there are more steps to be made. For instance he never attended a ROT meeting himself, only once when he joined the previous ROT member to see how things were going (C4.1). Generally the operational actors in their role as first responder are well trusted for their capabilities in firefighting. People are confident about the expertise of the firefighters and their response repertoires, moreover they believe the military fire department equipped with crashtenders will extinguish airplane fires rather quickly, which is an acceptable assumption since the fire department exercises this response to great extent. People seem to be more concerned about the multidisciplinary coordination (e.g. ROT and GBT) and the lines of communication it entails. Since the introduction of consignment the amount of people who can be called upon to enter such a team has increased. These people need the necessary training (and eventually experience) to work in such teams. Although one might argue the multidisciplinary coordination is less relevant for airplane incidents because they are likely to end fast, yet the scenarios are not limited to airplane crashes therefore people must be careful with expectations. The training of other scenarios will be addressed later in the paragraph about learning and growing. First the flexibility of the CRO will be explained.

**Flexibility**
The second aspect of principle 4 ‘commitment to resilience’ was analysed by asking the respondents questions related to flexibility. This aspect has some resemblance with the aspect ‘command and control’ of the previous principle, but instead of the organizational structure this aspect aims to describe the flexibility of response repertoires. The foremost response to airplane crashes entails fire extinguishment followed by the evacuation of POB’s. Regarding fire extinguishment the fire department needs enough capacity to extinguish fire. Airplane crashes are likely to cause extreme fires due to the presence of airplane fuel and sometimes oxygen storage tanks. Based on the Aeronautical Information Publication of 2009 and annex
14 of International Civil Aviation Organisation, airport Eindhoven has fire risk classification 8. If necessary this can be expanded to fire risk classification 9 or 10 (VR, 2015, p. 5). The numbers correspond with a theoretical estimation of the required firefighting capability. For example an average passenger airplane of Ryan Air or Transavia requires a classification of 7 or 8. Higher classifications are needed less frequently because they involve other types of airplanes. According to respondent C (KLu fire department) the CRO does not worry about the material capacity for fire extinguishing. Vlb EHV has 5 crashtenders, whilst most of the times 3 are needed. He states: “The only problem is the capacity of manpower. We are short on people, so currently we are risk classification 7 with two crashtenders, but if needed three people from a normal watertender can shift to another crashtender so that a classification of 8 is reached, and three crashtender can be deployed.” (C4.1). On the follow up question whether the expected increase in civil flights at airport Eindhoven has an impact on the CRO he answered no, because only one airplane can take off or land simultaneously. Since most civil flights require a fire risk classification of 7 or 8 (thus 2 or 3 crashtenders), the capacity of having 5 crashtenders is an indicator for commitment to resilience. Moreover the actual overcapacity makes that KLu crashtenders have been deployed multiple times to assist in industrial- or wildfires, such as the chemical fire at Moerdijk in 2011 (Ministerie van Defensie, 2016).

Another example that indicates the flexibility of Vlb EHV, although not directly related to the operations at airport Eindhoven, is the MH17 crisis. On the 17th of July 2014 Malaysia Airlines flight MH17 crashed in the Ukraine after it was hit by a ground-to-air missile. On the 23rd of July 2014 the first airplane arrived at Vlb EHV to bring the coffins of the casualties. The decision to use Vlb EHV for the ceremony was made the day before (Klu, 2014). Respondent D (KLu Operations and Coordination) explains: “Nobody said before how this could be done, a scenario of a thousand people at Eindhoven Air Base. Who also needed catering and sanitary. There was no premade scenario, there were no procedures. And yet, when the unexpected happens, there is some kind of structure, and the company is flexible in such a way that you can handle the MH17 scenario.” (H4.1). The MH17 is a good example of the flexibility that airport Eindhoven has. Looking at the impact such events have in the organization, crisis situations like MH17 can be compared to airplane incidents, of course without the necessity of first responders, but the second phase is aftercare and is similar. In both cases the units for O&V and Voorlichting need deal with a flow of people that is expected to visit the airport during such situations. Those people have unanswered questions
and will eventually need catering and sanitary. To accommodate in such unexpected events it all comes down to the competences of people at the airport because sometimes there simply are no premade scenarios.

It is clear that in the operations of the CRO nothing is carved in stone. People have a certain mind-set that understands there is always a possibility of an unexpected event. You cannot know what or when something will happen, therefore you need to trust on their abilities to cope with change. Also policy and plan makers need to cope with change. Since the enforcement of the Wet Veiligheidsregio’s in 2010, the crisis and disaster plans of the municipality were transferred to the VR, and it became organized regionally. Respondent E (Municipality Eindhoven) states nothing is sacred and the developments need to be dealt with (E4.2). He argues the public administrative organizations move slower and things need time in order to be updated, but also the policy and plan making side of the CRO is flexible. All the partners contribute equally and their input weighs the same (E4.3). That is to say that all the stakeholders in the CRO have their own interests and demands. So if for example the police or KMar want to add or change something in the CBP, there is room for it. How this affects the CRO will be explained in the next paragraph.

**Learning and growing**
The third aspect of principle 4 ‘commitment to resilience’ was analysed by looking at two components of resilience namely learning and growing. From the internal perspective the interviewees were asked if the CRO learns from earlier made mistakes. Furthermore linking it to practices from similar organizations and global issues such as terrorism, this is the external perspective. It is clear that the CRO registers, shares and evaluates incidents. Nevertheless evaluations do not necessarily have to lead to improvement or growth of the CRO. As stated earlier incident evaluations can become a ‘ritual dance’ if lessons are not learned and structural improvement fails. The earlier argument of respondent H (KLu Airport Services) states the CRO is resilient in incident response, but afterwards new challenges cause the learning moments to fade away and not come back into the organisation (H1.3). This is a common thing in organizations because there is usually not enough capacity to grasp every opportunity for change, after all a crisis organization is not the main reason of existence. A common counterargument against change is that the organization lacks time and resources. Nonetheless change is not always good, especially when it involves the creation of more regulation. A frequent and yet inevitable pitfall of organizations is the tendency to create
more regulation after something went wrong. For example the introduction of new restrictive rules after someone made a mistake. One might argue that this is a learning situation. Others might argue the organization gets less flexible when new regulation is created. Respondent I (KLu flight safety) does not think the flexibility of the CRO is decreased because incidents happen. He believes: “Resilience is rebuilding and improving after something went wrong. With our debriefs, discussions and changes in plans, I think we definitely do that.” (I3.1). He argues the goal of the CBP is to keep it lean and mean, so people have a solid and understandable basis to work with. Learning is done but in the form of small tweaks. It is not the intention to go for a complete different approach after something went wrong (I4.2). It seems the CRO joins the widespread believe of HROs that formal procedures are fallible and require adjustments in order to uphold resilient performance (Weick & Sutcliffe, 2007, p. 73). This also means that when things have failed there is no need to change paradigm, often minor things are learned and small steps to improvement can be made. It is important to stay rational and not let fear guide the way, which sometimes happens with public threat perception after for example terrorist attacks.

From an external perspective there is resilience in the face of adversity, for example the demand of stakeholders to focus more on security issues related to public threat perception. Whereas the primary goal of the CBP is to coordinate a multidisciplinary response to (expected) airplane incidents, the secondary goal is to cope with aspects of extreme violence such as the landing of a hijacked airplane, or cases of infectious diseases carried along an airplane. Respondent J (EA safety manager) states the CRO is continuously thinking of innovations and the possible incorporation of ‘hot’ issues. They have an active attitude towards new questions about modernization (J4.1). Airport Eindhoven is the second biggest airport of the Netherlands. The biggest airport is Schiphol Amsterdam, which is the first appointed national airport for airplane crisis scenarios that involve extreme violence or infectious diseases. Airport Eindhoven is the official alternative location for such scenarios. National and global issues are discussed in the CRO, which thereafter feeds the CBP scenarios says respondent E of municipality Eindhoven (E4.4). Respondent J explains there were events that nobody has thought of before, and now they are translated into scenarios, which are trained ‘endlessly’ (J4.1). The most relevant example is exercise First Strike.
Exercise First Strike

On the 29th of January 2015 a big counter-terrorism exercise was conducted at airport Eindhoven with special units from the Police and KMar (Omroep Brabant, 2015). During this multidisciplinary exercise the leading role in the CRO was played by KMar. About 350 people were involved in the exercise that came from various organizations such as the military: KMar, KLu, and KI, and civil: VR, Police and the fire department. The played scenario was a civil flight with a hijacked KDC10 and 87 POB’s. The airplane landed on airport Eindhoven under the guidance of two F16 fighter jets. Thereafter followed a counter-terrorism intervention by special units of the KMar and Police (Kmar, 2015). According to respondent G (KLu Bedrijfsveiligheid) the operational units of organizations in the CRO wanted to join the exercise from the beginning. At first the VR was not willing to cooperate in the exercise. Respondent G noticed a reluctant attitude with public administrative leadership. Then a written letter by a coalition of operational actors was send to the president of the VR to get more attention for the CRO. In the end solidarity got the upper hand and the CRO got together. Respondent G argued things are getting better with administrative leaders who are currently in office; it is moving in the right direction (G4.2).

Conclusion principle 4

In light of Wildavsky’s (1988) notion of trial and error, the best way to increase safety is by experiencing setbacks, recovering from them, and eventually built resilience. The way to experience trial and error is either through real incidents or by training them. Weick & Sutcliffe recommend enlargement of competencies and response repertoires, thus not repeatedly training the same but uncovering new capabilities for action (2007, p. 157). In view of the theory, the CRO’s tendency to cover the required multidisciplinary training with table tops is not preferable for acquiring knowledge and learning, also because routine jobs have a tendency to become mindless jobs and table-tops don’t contain face-to-face contact between operational actors. There is a pitfall in the lean and mean organization because it strips the organization from flexibility and resilience by limiting the available responses. Despite the repetitive choice of table-tops there are initiatives of organizations within the CRO to organise mutual training without the presence of VR, such as the mutual fire department exercises. Furthermore Police and KMar create new response repertoires as was shown in exercise first strike. Whereas the administrative public organizations in the CRO are
more stiff and rigid compared to the operational organizations, they don’t necessarily have to be completely together in order to build resilience. Nevertheless the exercising operational organizations do need to accelerate their feedback towards the policy and plan makers. Weick & Sutcliffe alert that initial effects of attempted improvisations have to be deleted quickly if they make things worse (2007, p. 157). Hence leaving out the VR requires fast feedback to the organization because changes might have an impact on them or they can spot problems that were not detected initially.

**Principle 5: Deference to Expertise**
The fifth principle that was analysed is deference to expertise. With respect to the traditional hierarchical structures of organizations, HROs create an operating dynamic which finds and uses the expertise of people on the work floor. For this research the principle was divided into two aspects. The first aspect is downward deference. In order for organizations to catch small errors and mistakes, leaders need to sympathize in the work floor and preserve close contacts with operations. The interviewees were asked if the higher ranking officials in the CRO really know what happens on the work floor. The second aspect is expertise versus hierarchy. This describes the influence of people with operational knowledge and experience versus and the influence of people from higher organizational ranks or positions. Interview questions asked who has certain influence and whether decision making is done by the right people.

**Downward deference**
The first aspect of principle 5 ‘deference to expertise’ was analysed by asking the interviewees if higher ranking officials really know what happens in operations of the CRO. Unexpected events begin down in the organization where early signals of failure can show. This signals might be invisible for operational actors due to a ‘tunnel vision’ or fixation on the daily work, whereas directors, managers or policy actors might be able to see them if they have a clear view on the situation and are aware of discriminatory detail. The analysis starts by describing the opinion of officials in the management level, followed by the opinion of the operational level and plan making.

Respondent F (KLu chief of staff) in his role as deputy commander is the highest ranking interviewed official of Vlb EHV. He states the interaction with the operational level is embedded in the organization. Managers receive information on what happens in operations and he believes it works properly (F5.1). Vlb EHV has safety board meetings every four to
eight weeks that include the commander of the air base and operational leaders (F5.1). During these meetings incidents and errors in the organization are discussed. Also the safety goals are set and organizational safety norms are created. Throughout his position as chief of staff, respondent F tries to carry out the power of personal interaction. He does so by inspiring people to think about the ‘raison d’être’ of Vlb EHV. He argues: “*In light of ‘the golden circle’ theory by Simon Sinek, who reasons from the ‘Why, how and what’, the main question is the ‘Why’. There are people that run the core operation of an organization. They are our reason of existence. They are dependent on us. So we need to understand why they do things, and only if we understand why they do things, we can help them adequately.’*” (F5.2). The following figure is an illustration of ‘the golden circle’ of the ‘Why, How and What’ from the book ‘*It starts with why*’ by S. Sinek (2009).

![Figure 7: The golden circle – Why How What (Sinek, 2009).](image)

The chief of staff is physically not much present on the work floor, therefore he appointed two officials who do that for him. They walk around the operations with a ‘safety mind-set’ and talk to people to gain information and spread safety awareness. In this way the chief of staff tries to obtain the signals from operations, which he thereafter uses to inform the commander of Vlb EHV (F5.2). The section bureau Bedrijfsveiligheid will register and monitor the signals, and do further investigations if necessary. Respondent I (KLu flight safety), who’s responsible for flight safety investigations, adds that every report of an incident or error will be visible for the management in the registration program. Essentially that is the reporting tool in Peoplesoft, and if it entails flight safety it can be forwarded to another program for further investigation. After sharing the reports to the management level,
they will only show the facts, not names and details because those are protected to uphold the free reporting culture (I5.1). It is the role of section Bedrijfsveiligheid to communicate with other organizations in the CRO and inform them on findings that might have an impact on them.

Respondent H (KLu Airport Services) believes the management knows for the most part what is happening on the operational level, but that there are some ‘blind spots’. This partly has to do with tensions between safety and financial capabilities. For example the fire station at Vlb EHV can’t produce enough extraction of diesel engine emissions, so the fire department can’t practice an emergency response starting from the inside of the station (H5.1). Instead the crash tenders start from outside of the fire station. Respondent H argues: “The management, also widespread KLu management, thinks the situation is under control because there is no violation of the Arbo norm when the crash tenders are used for deployment outside. Management believes the start-ups are easy and don’t necessarily need to be done from the inside.” (H5.1). Respondent H thinks reality is usually more uncontrollable and there are still some steps to be made. Understandably the management of Vlb EHV, besides a functioning crisis organization, also has to comply with the legal system. In this case it means compliance to the occupational health and safety (OHS) system regarding diesel emission regulation. At this point is often comes down to a risk management system that weighs the various points of attention and advices a line of action, which sometimes can be conflicting. A key thing to remember is that technical modification to structures or buildings costs a lot of money, for example the creation of a new diesel emission extraction system, therefore the risk management system assumedly allows a longer period of continuing operations before minimization or elimination of the risk involved in the emissions. Assumedly the option of outside start-ups is a temporarily solution. Nonetheless it is important for trust and respect by operational actors to uphold a dialogue between management and operations, and keeping operations involved in future development of a (new) building. This is likely to result in a higher perception of credibility with operations. In the end people on the work floor know what issues exist in operations and how issues can be eliminated in the modification of procedures.

As stated earlier the CBP procedures are not made out of the blue. Operational actors are consulted because they hold the expertise and know which issues will be problematic in real operations. Respondent A (VR) states the connection between management and operations is
present in the CRO, and operational actors are consulted during the plan making process. Yet a lot organizational issues only affect the monodisciplinary structure of an organization, or sometimes procedures work well in the monodisciplinary structure but don’t work in the multidisciplinary structure. The policy level of the VR and municipality Eindhoven are only interested in the broad view that covers the CBP. Small disturbances are to be dealt with inside the own organizations (A5.1). Like Vlb EHV also the VR has to deal with the economic situation and budget cuts on the organization. Considering the water tenders of the civil fire department, there used to be 6 people manning one truck, now there are only 4. This has complications for response plans, therefore also affecting the CBP which causes dissatisfaction with operational actors. Respondent A argues there is always resistance in the beginning, but after a while the operational actors will help to think in solutions for the CRO (A5.1). After a period of resistance towards the decision to decrease the amount of people on a fire truck, the decision will be accepted eventually. Thereafter flowing into a phase in which people start thinking in modifications for response plans, hence with less people but with enough manpower to perform the tasks. Despite the inevitability of budget cuts, it does have a negative effect on the relationship between management and operations. Operational actors can feel disrespected when their resources are cut by a higher power, yet this is often done on a supra-organizational level by ministries or parliament.

Respondent B (Civil fire department), in his role as both plan maker and operational leader, says plan- and decision makers are sometimes too far away from the reality. Respondent A acknowledges the incapacity of the VR which makes plan making too much fixated on people from the cold side of the CRO. It would be better to involve more operational actors in the plan making (A5.2). Decisions are sometimes made without the proper consultation of operational actors who have to execute the plans, resulting in frustration amongst operational actors who feel distant towards people in the ‘ivory tower’ (B5.1). The CBP is mostly based on the multi-environment coordination and therefore do not give the firefighters any technical information on how to handle specific military aviation approaches, such as the presence of ammunition in airplanes. Respondent B explains it is has more to do with the specific education of people (B5.2). The airport specific education and knowledge on how to respond to (military) airplane incidents is logically more present at the military side of the CRO, specifically with the military fire department. But in retrospect of the actual flight movements, most flights are civil (over 70% in 2015 (Klu, 2016a)), and will not carry military equipment. This relates to another concern by respondent H (KLu Airport Services)
stating the military fire department mainly exercises with military airplanes, yet most flights are civil airplanes. Therefore it is important to also do exercises with civil airplanes, which has been acknowledged by the KLu fire department (H5.2).

**Expertise versus hierarchy**

The second aspect of principle 5 ‘deference to expertise’ was analysed by asking the interviewees if people who hold expertise are of more influence than people who have a higher hierarchical position. Along with the question if decision making is done by the people who are most qualified to do so because of their knowledge or experience. As was already stressed in the theoretical framework, the concept ‘expertise’ differs strongly from the concept ‘expert’. Everybody can hold a certain expertise when they gained knowledge or experience, whereas the term expert is usually used to refer to exceptional human beings who mastered a specific topic. HROs are more in favour of the word expertise and say it is not necessarily matched with a hierarchical position.

In monodisciplinary sense Vlb EHV is a traditional hierarchical organization. Despite the existence of ranks people generally believe this does not pose a problem for decision making in operations (C5.1)(D5.1)(F5.3). Respondent D (KLu Operations and Coordination) wants to give forth that people can decide many things for themselves. He wants to show trust to people and encourages to take ownership of problems. So on the condition that things are done responsibly, a lot of things can be decided without the consultation of a higher ranking officer (D5.1). This also relates to the reorganization of KLu according to the CLSK3.0 program in which trust and ownership spearhead the desired social and cultural change. In retrospect of the theory by ’t Hart et al. (1993) it is important that decision making can be done on the operational level. The leadership at Vlb EHV shows they have trust in the expertise of people at the operational level by allowing them to make their own decisions.

In the multidisciplinary environment a key thing to remember is the difference between the cold and warm side of the CRO. The former is the policy level where plans are made, and the latter is the operational level. The operational level can thereafter be subdivided into first responders such as firefighters, and coordinative liaisons in for example the ROT and GBT. In the cold side hierarchy is not directly of influence because policy teams run the tasks based on equality says respondent E of municipality Eindhoven (E5.1). So for the plan making of the CBP every organization or individual actor can give input which weighs equally amongst
all participants. In the creation of the CBP the plan makers need to consult the operational actors because they need to work with it. Respondent B (Civil fire department) has both a role in the cold side as plan maker, and in the warm side as OvD. He argues there is a large distance between policy and operations. High ranking officials (i.e. mayor and directors of Vlb EHV and EA) are in the end responsible for the CBP, but you cannot let them decide on their own. So there are scheduled coordinator meetings (for ‘middle management’) and operational meetings during real incidents or exercises in order to check the feasibility of plans (B5.3).

In the warm side of the CRO hierarchy corresponds to operational leadership, in which decisions need to be made with a sense of urgency, therefore there is less room for discussion (A5.3). People need to listen and take orders from the OvD in command, for example in a CoPI or ROT. According to the GRIP procedure the location of decision making depends on the upscaling, it can either be at the operational level and remain there for the duration of the incident, or it can be up scaled to the strategic level when more administrative leadership is needed. It is important to stress that the GRIP procedure in the Netherlands has a form of decentralization of decision making embedded in the system. Thus not before an incident is assessed and characterized as ‘large’ (which requires a GRIP level 3 upscaling), the decision making will remain at the operational level, this includes a CoPI and ROT (COT, 2007, p. 10). This decentralization allows for the necessary situational assessment which cannot be done by members from a policy team that make strategic decisions from distance. Therefore the initial first phase of crisis response at airport Eindhoven will include decision making by actors who are present on the location. This is in line with the decentralization of decision making by ’t Hart et al. (1993). So there is a large role for operational actors such as the OSC at airport Eindhoven. They are trusted for their expertise which puts them in the position to make critical decisions.

Other operational actors can act as a liaison officer, for example on behalf of Vlb EHV in an ROT or GBT. Respondent G (KLu Bedrijfsveiligheid) explains that since the start of liaison officer consignment with officials from Vlb EHV about two years ago, they are experiencing errors. As mentioned earlier a larger group of people is assigned to the consignment scheme, but experience has shown that in general people at Vlb EHV need more training or education on how the CRO works (G5.1). Due to the large population they have less certainty that there is always a liaison officer with the right expertise to uphold that position. Looking at the
factors that influence decision making according to Klein et al. (1993) the experience and shared knowledge of a crisis organization are on the upper hand, whereas plans and procedures are less likely to be influencing critical decision making. Providing the consigned officials with enough expertise is not likely to happen through written procedures, it will require experience which can be done by training or actual deployment of the CRO. Thus whether decision making in an ROT or GBT is done (or influenced) by a liaison officer with the most expertise is discussable. In the end making any decision will always be better than being in a state of indecision. And if you don’t something it is better to admit you reached the limits of you knowledge than to pretend. Asking questions when in need of help is considered a strength in HRO theory (Weick & Sutcliffe, 2007, p. 80).

**Conclusion principle 5**
The importance of downward deference and the value of expertise seems well understood in the CRO of airport Eindhoven. At KLu the current reorganization has a prominent role for the professional that lies within the workforce. Leadership shows trust in people at the operational level, who are credible to solve problems and allowed to come up with innovative solutions. According to Weick & Sutcliffe a small win in the development of deference to expertise is the encouragement of imagination as a tool for managing the unexpected (2007, p. 159). By valuing imagination you promote mindfulness that can help to envision scenarios that have not yet been experienced or have been overlooked. The aspiration of improving on problem ownership shows KLu is looking in the right direction of deference to expertise. Despite the incapability of managers to be continuously present on the work floor, they created ways to keep being informed by the operations. For example by employing people who visit the work floor or inspiring operational actors write public reports on vulnerabilities of the organization.

Without doubt CRO leadership wants the best for their operational units regarding manpower and material, yet every organization has to cope with decreased financial capabilities. Most of the organizations need to cut on budgets or deal with reorganization. The decrease in economic resources tends to create more clashes of interest because there are fewer resources to share. Leadership is urged to focus on the broad organizational goals and therefore has fewer possibilities to agree to all the wishes of operational units. Despite this they know what operational units are capable of, and trust on their expertise in case something happens. Though a point of attention is the consignment of officials of Vlb EHV who might not all
have the knowledge and experience to function properly as a liaison. Considering critical
decision making Weick & Sutcliffe (2007, p. 160) promote a flexible decision structure that
should shift the attention to those who have the most expertise to deal with the problem. But
because of limitations in the GRIP procedure this is not always possible. New developments
in a more flexible GRIP structure are being investigated by Van Duin & Wijkhuijs (2015).

Answer to the research question

“To what extent can the Crisis Response Organization of airport Eindhoven be characterized
as a High Reliability Organization, and how can discrepancies be explained?”

First and foremost the characterization of HRO is not an objective scale for measurement.
That is to say the term HRO can be considered a paradox, because also HROs make mistakes
and can suffer from incidents or crises. So being characterized as a HRO does not imply the
organization is invulnerable to unexpected events. It merely shows the organization has
developed ways to perform resiliently and mindfully by upholding the five principles.
Exploring HRO characterizations in a multidisciplinary organization is essentially different,
because tensions exists where different interests conflict, which is considerably more than in
individual organizations. VlE HV is preoccupied with failure by actively searching for weak
signals of failure, yet this mindful practise should not spoil the multidisciplinary
communication with weak signals which are not relevant for others or don’t have an impact
on the CRO. Nevertheless the open and blame-free culture together with the willingness to
share and discuss information is a positive sign that is alike HROs. Considering the
reluctance to simplify the widely shared vision of a lean and mean CBNP and CBP is
something a HRO would endeavour. Different is that participating organizations in the CRO
are historically structured in different ways, so not all organizations in the CRO can adopt the
same response plan or procedure without complications. But developments are visible since
the barrier of secretive information from the air force goes down and transparency is the
incentive for mutual trust and respect in the CRO. The CRO has sensitivity to operations to
the extent that operational first responders of both civil and military know where to find each
other.Arguable is the level of interaction and readiness of officials that should take part in
multidisciplinary coordination during GRIP upscaling. In view of the core business of the
airport the main focus should lie on airplane crash scenarios, which are highly energetic in
light of the simplification of ‘the golden (half) hour’, thus multidisciplinary coordination in ROT’s and GBT’s can be considered less relevant. Yet expectations must be carried lightly because often things fall outside of the realm of planning, then functioning lines of communication is the most important factor. The CRO is committed to resilience by investing in multidisciplinary training alongside global security issues. Full scale multidisciplinary training is difficult, yet the CRO should not let itself choke on restrictions of slow moving public administrative organizations and take initiative for smaller operational exercises with less preparation of units. A key thing to remember is the fast necessary feedback for plan makers who simply cannot know everything, but do need the valuable information of operational actors in order to make the plans realistic and reliable. In view of the final principle deference to expertise the CRO has a respectful attitude towards the people that run the operations. They are the reason of existence which is also perceived like that. The historical time in which high ranking officials were seen as the experts of an organization is no longer present in this CRO. But in time of urgency the course of action will be decided by the hierarchical officers that are trained to lead an emergency response. In the end resilience is a concept that has many similarities with the work ethics of the air force and emergency responders. In conclusion the CRO of airport Eindhoven can be characterized as a high reliability organization, provided that the discrepancies are best explained by the differences in organizational structure of the separate organizations and the general restraint to perform tasks that have little to no impact for the CBP because of an incapacity of public policy makers.
Chapter 5: Discussion

This research was conducted to explore the characteristics of high reliability organizing in the multidisciplinary crisis response organization of airport Eindhoven. Next to the concluding answer of the research question from the previous chapter, this research also provides a discussion on the limitations and possible pointers for future research. A reflection was made on the theoretical framework by scrutinizing its applicability in a multidisciplinary organization. Furthermore this chapter contains recommendations in the form of small incremental steps that can be made by the CRO in order to improve its mindful practice and uphold its resilience.

Limitations
As was stated earlier in the methodology chapter this research was limited by the number of respondents for semi-structured interviewing. For this research 10 respondents have been interviewed. The most prominent organizations of the CRO according to the CBP were included in this research, yet some organizations such as the Police and KMar who play a role in the CRO and the execution of the CBP were not interviewed. An extension on the number of interviewees was not feasible considering the time and size of a master thesis. In order to gain a more comprehensive understanding of the perception of actors in the CRO more research is needed that leastwise includes all participating organizations according to the CBP. Furthermore a bigger respondent size is needed in order to create statements that represent a bigger part of the organizations and therefore can improve the internal validity of the research.

Another limitation is the focus on the crisis organization, whereas many social and cultural norms go beyond the crisis organization and are also visible in normal operations. Although the data collection of this research was not limited to solely the CRO (for instance the semi-structured interviews covered also normal operations), yet the document analysis was confined to the content of the CBNP and CBP. Unfortunately these documents give limited insight in the standard operating procedures of the organizations under normal circumstances. Future research should also look into a larger amount of documents that can contain information relevant to the five principles of HRO, especially because the first three principles focus on anticipation which is the preventive phase of managing the unexpected.
Reflection on theoretical framework

The main theory in this research was about high reliability organizations by Weick & Sutcliffe (2007), who defined five principles of resilient performance by studying organizations like nuclear power plants, aircraft carriers, air traffic control and fire departments. The reason these organizations were studied was because they are successful in avoiding disasters in an environment where accidents can be expected due to complex systems and involved risks. The organizations were (assumedly) observed in a monodisciplinary structure, hence studying the operations of a separate organization without interaction with other organizations. When applying the five principles to a multidisciplinary structure there are some complications. For instance principle 1 preoccupation with failure implies that weak signals of failure should be actively searched and detected, which is good in a separate organization, yet it is not desirable to share findings that have very little impact in the multidisciplinary environment because it will create an overflow of information. Also the literature from Weick & Sutcliffe dates from 2007 (second edition), which means the practices that are observed in their study are over 10 years old. In the years after the publication there have been developments and technical innovations that might outreach the content of the five principles. For example the use of social media platforms for (crisis) communication which allows the sharing of rich media such as images and videos.

Recommendations for policy and leadership

Before giving actual recommendations it is stressed that the act of giving recommendations is a discussable topic along HRO theorists and practitioners. It is arguable that providing recommendations by external researchers suggests the final phase of a project. This means the studied organization receives the research file, picks out some of the recommendations that seem feasible, whereafter gradually interest in the topic gets lost. While structural improvement requires mindfulness to be embedded in the social and cultural norms of the organization. HRO research and mindfulness thinking should be a continuous cycle that is part of daily operations which exceeds the capabilities a master thesis and its recommendations. Therefore, by way of speaking, the word recommendations should be nuanced and expressed as small incremental steps in the development of mindfulness and resilience. Alongside the five principles of HRO some small steps for improvement are given.

A small step for improving preoccupation with failure is to reset organizational safety goals in the form of failures that must not occur (Weick & Sutcliffe, 2007, p. 151). In this way
people are put on notice to look out for failures and might become more aware and alert on failure. Coming back to the clash of interests between units of operations and logistics at V1b EHV, it might by an option to restate current safety goals so that they suggest the avoidance of mistakes. As an example instead of stating ‘Fly responsibly’, a safety goal could be ‘Don’t fly with an airplane with more than 5 green complaints’. It triggers the workforce to be preoccupied with failure. A small step in the development of resistance to simplification is to do a review on the SITRAP form that is used to inform Cdo KLu after an incident or crash. In light of HRO theory it is advised to start a SITRAP with a blank textbox in which people can give a detailed explanation of the situation (for instance with a maximum of five sentences). One might argue it decreases the speed in which the form can be written and disseminated, yet it allows people to share their initial detailed expression before checking the boxes.

In view of the plan making of the CBNP and CBP a step to improvement is to increase effort in the encouragement of operational actor involvement. Thus finding ways to increase the intrinsic motivation of the work floor to provide the plan makers with input. A way to encourage them is to talk about the changes that are made in the plans, not only about the modified content but also about the changes in goals and the process. People tend to hold on to earlier interpretations of the plans. So possible earlier experience or complaints with the plans (e.g. the plans are too big, too vague, complex, or they don’t reflect reality) can withhold people from revising their viewpoint. Therefore it is advised to use changes in plans as evidence that the CRO is trying to improve and being public about it. A way to do this is to make comparisons between the current versions and the upcoming updated versions, and thereafter using the comparison as input for a training or briefing regarding the CRO.

An innovative and rather drastic step for improving sensitivity to operations (as well as deference to expertise) could be to explore the use of self-organizing crisis response units who use rich media platforms for communication. Self-organizing units are ad hoc networks that can provide problem solving to incidents at airport Eindhoven. The assembly of members of such units comes forth out of the organizational resilience and utilizes the speed and possibilities of smartphones connected to the internet. Often in the wake of an incident or crisis many lines of communication go through telephone or text messages, whereas the current technological situation offers more options that use rich media for communication. As an example the use of smartphone applications (e.g. WhatsApp or Facebook Messenger) that allowing the sharing of messages, pictures and videos between multiple persons in a group.
Although face-to-face contact is the richest source of communication in the eyes of Weick & Sutclifffe (2007, p. 155), the use sharing of media could help people to build an idea of the incident they face. It can also help responders on their way to the location of the incident to adjust their expectations when images are send beforehand. The groups can also include liaison officers that are in multidisciplinary coordinative teams at the VR, so they can create a better image of the situation. An implication with the use of ad hoc self-organizing units is that they arise out of initiative, hence they are more informal and uncontrollable which is problematic for policy and plan makers because they are not in favour of such uncertainties since they cannot be written down in procedures. Yet reality often shows that information is faster obtained through social media than the official connections an organization might have. Despite the informality of ad hoc network organizations they do contribute to resilience say Weick & Sutclifffe (2007, p. 157). Today’s technological innovations can also be merged and tested in the multidisciplinary training.

In view of improving the commitment to resilience the CRO has already acknowledged the problems with large scale multidisciplinary training and opted for smaller scale exercises with less preparation of units. This is something Weick & Sutclifffe (2007) would endorse because they prefer faster and flexible response capabilities. Small scale exercises are easier and faster to realise, and if they allow less preparation it will be even more realistic because real incidents also come without (direct) warning. Furthermore smaller exercises are able to produce faster feedback, so any negative effects or failed improvisations can easier be deleted. A key thing to remember in the deference to expertise is to beware of the fallacy of centrality (Weick & Sutclifffe, 2007, p. 158). The fallacy is that people assume that leaders in a central position know when something serious happens on the work floor, yet often the contrary is true. That is to say the multidisciplinary leadership of a ROT or GBT that can be created at the VR in the centre of Eindhoven is less likely to understand what happens at the airport when something serious happened. Nonetheless when people are entrusted the role of liaison for the CRO it is important they have the knowledge and expertise to perform their task. In the end the CRO will need its experts at the right location, which is the airport.
Bibliography


## Appendix 1: Operationalization scheme

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
<th>Indicators</th>
<th>Data Sources</th>
<th>Interview questions</th>
</tr>
</thead>
</table>
| **HRO Principle 1: Preoccupation with failure** | Ability to track down weak signals of failure, and to report and stop them (Weick & Sutcliffe, 2007, p. 46). | - Actively searching, detecting and reporting (weak) signals of failure.  
- Mutual evaluation of reports and incidents.  
- A reporting culture in which mistakes are not held against people. | Semi-structured interviews:  
- Management level  
- Operational level  
Document analysis  
- CBP  
- CBNP | See interview guide in appendix 2.  
Question: 1.1 up to and including 1.6 |
| **HRO Principle 2: Reluctance to simplify** | Ability to question and discuss issues and to invite people to be sceptic and look different to aspects of the organization (Weick & Sutcliffe, 2007, p. 53). | - Nuanced assumptions and a questioning attitude of people in the CRO.  
- A precaution for the hazard of (shared) labels.  
- Mutual trust and respect as a condition for a sceptic and questioning attitude towards partners in the CRO. | Semi-structured interviews:  
- Management level  
- Operational level  
Document analysis  
- CBP  
- CBNP | See interview guide in appendix 2.  
Question: 2.1 up to and including 2.6 |
| **HRO Principle 3: Sensitivity to operations** | A shift of attention towards the operational level, as an incentive to see what is actually being done, thus away from the strategic level in which designs and plans tell | - Interaction between operational actors in order to have a clear understanding of the mutual deployment.  
- A less rigid and stiff command and | Semi-structured interviews:  
- Management level  
- Operational level | See interview guide in appendix 2.  
Question: 3.1 up to and including 3.4 |
HRO Principle 4: Commitment to resilience

<table>
<thead>
<tr>
<th>What is supposed to be done (Weick &amp; Sutcliffe, 2007, p. 59).</th>
<th>Control that has courtesy towards working out of line or rule deviant behaviour on the condition it remains responsible.</th>
<th>Document analysis - CBP - CBNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to absorb strain and continue functioning through fast negative feedback. Also to bounce back and recover from unwanted events, and to learn and grow from them (Weick &amp; Sutcliffe, 2007, p. 71).</td>
<td>- The experience of strain either through real-time events or multidisciplinary training in order to improve response repertoires. - Flexibility of the organization to bounce back from setbacks and findings ways to improve it. - Learning and growing of the organization by learning from mistakes and exploring new challenges or methods.</td>
<td>Semi-structured interviews: - Management level - Operational level Document analysis - CBP - CBNP</td>
</tr>
</tbody>
</table>

HRO Principle 5: Deference to expertise

| While respecting hierarchy, also valuing the operational level, since higher-up functions tend to experience less of what’s happening on the work floor due to information filtering (Weick & Sutcliffe, 2007, p. 74). | A downward deference in order for managers to know what is happening on the work floor. - Value the influence of expertise over hierarchy so decision making is done by the most qualified. | Semi-structured interviews: - Management level - Operational level Document analysis - CBP - CBNP |

See interview guide in appendix 2.

Question: 4.1 up to and including 4.5

See interview guide in appendix 2.

Question: 5.1 up to and including 5.3
Appendix 2: Interview Guide

Principe 1
1. Bent u actief bezig met het zoeken naar kleine verstoringen en fouten binnen de CRO? Indien ja, hoe doet u dat?
2. Near misses (“het ging nog net goed” en “nog net niet fout”) zijn signalen die potentieel gevaar blootleggen. Hoe gaat u om met ‘near misses’ in de CRO? Wordt hier binnen de samenwerking wat mee gedaan?
3. Als er tijdens een response actie iets onverwachts heeft plaatsgevonden, wordt dit dan gezamenlijk geëvalueerd? Heeft dit nog andere mogelijke gevolgen? Bijvoorbeeld voor procedures?
4. In CROs worden fouten gemaakt, tegelijkertijd wordt dit niet altijd door andere participanten opgemerkt. Wat doet u als u een fout heeft gemaakt?
5. Voelt u zich vrij om met leidinggevenden van de CRO te spreken over problemen?
6. Wordt u gestimuleerd tot het melden van fouten binnen de CRO? Is er een beloning strategie? Wordt dit niet tegen u gebruikt?

Principe 2
1. Neemt u zo maar iets aan van een ander of bent u geneigd eerst te vragen? En van iemand binnen de CRO maar buiten uw eigen afdeling?
2. Voelt u zich vrij om problemen ter sprake te brengen binnen de CRO? Of bijvoorbeeld van situaties die al tijden volgens een vast patroon gaan maar waarvan u denkt dat dit niet te optimale is?
3. Wordt u aangemoedigd om een alternatieve kijk te geven op situaties?
4. Als u een situatie bekritiseert, wordt hier dan serieus op ingegaan? Hoe wordt dit gewaardeerd?
5. Wat vindt u van het onderlinge vertrouwen tussen de organisaties in de CRO?
6. En wat betreft respect?
**Principe 3**

1. Vindt u dat operationele mensen voldoende interactie met elkaar hebben om een helder beeld te hebben van de gezamenlijke inzetbaarheid?
2. Hoe wordt er gereageerd als mensen problemen oplossen die niet in hun eigen functie vallen?
3. Hoe wordt er gereageerd als mensen problemen oplossen die niet volgens de afgesproken procedure gaan?
4. Zijn mensen bevoegd om onverwachte problemen aan te pakken?

**Principe 4**

1. Vindt u dat er voldoende geïnvesteerd wordt in gezamenlijke training van de CRO?
2. Wat vindt u van de kennis en vaardigheden van de CRO? Is de organisatie actief bezig met ontwikkelen? Zijn er uitdagingen?
3. Hoe staat de CRO tegenover nieuwe werkwijzen?
4. Wordt het gebruik van informele contacten getolereerd?
5. Leert de CRO van eerder gemaakte fouten?

**Principe 5**

1. Weet het management wat er op de werkvloer van de CRO speelt?
2. Is iemand met expertise meer van invloed dan iemand met een hogere hiërarchische positie?
3. Worden besluiten genomen door medewerkers die het best daarvoor gekwalificeerd zijn? (Meeste kennis, ervaring, wijsheid etc.)
Appendix 3: Informed consent

Beste respondent,
Alvorens het interview plaatsvindt, allereerst bedankt voor uw medewerking.

Doel van het onderzoek
Dit interview maakt deel uit van een serie interviews die gehouden worden in het kader van een onderzoek naar de crisisorganisatie van luchthaven Eindhoven. Het doel van het onderzoek is om de theoretische benadering genaamd ‘High Reliability Organizing’ (HRO) toe te passen op de multidisciplinaire crisisorganisatie van luchthaven Eindhoven, om vervolgens verklaringen te zoeken voor eventuele verschillen. HROs, oftewel hoog betrouwbare organisaties, zijn organisaties die succesvol zijn in het vermijden van rampen en crises in een omgeving waarin de kans op grote incidenten aanwezig is vanwege complexe veiligheidssystemen en risico’s. De theorie omtrent HRO richt zich onder andere op collectieve alertheid (of mindfulness) en een hoge mate van veerkracht.

Over het interview
- Het interview zal ongeveer een uur duren.
- In dit uur worden 5 principes over HRO besproken.
  1. De bezigheid met verstoringen en fouten
  2. Terughoudendheid tot simplificeren
  3. Gevoeligheid voor de uitvoering
  4. Toewijding aan veerkracht
  5. Respect voor expertise
- In het kader van de analyse dient het gesprek opgenomen te worden (alleen audio).
- De informatie verkregen uit dit interview wordt gebruikt als input voor het onderzoek. Dat betekent dat er quotes gemaakt worden van het gesprek, zonder daarbij uw naam te vermelden, maar wel de omschrijving van uw functie.
- Uw naam en de verkregen informatie wordt alleen gebruikt voor dit onderzoek, en zal niet verspreid worden buiten dit onderzoek.

Over de onderzoeker
Model ter illustratie van de 5 HRO principes

Betrokken partijen bij het onderzoek
Vliegbasis Eindhoven (militair); Eindhoven Airport (civiel); Gemeente Eindhoven; Veiligheidsregio Brabant Zuidoost en regionale brandweer Brabant-Zuidoost.

Na het interview
Komt u er na het interview achter dat u nog iets belanglijks vergeten bent te zeggen? Of is er mogelijk informatie niet correct besproken? Neemt u alstublieft contact met mij op. Het is belangrijk voor het onderzoek dat informatie juist geplaatst wordt en er geen belangrijke dingen achterwege zijn gelaten. U kunt mij bereiken via e-mail (********@outlook.com) of telefoon (06********). Uiteraard ben ik ook voor andere opmerkingen of vragen bereikbaar.

Bedankt voor uw medewerking.
Rob Groot
Appendix 4: Quote Book