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## Quick Response for Operational Centers

### D4.1 – Self-assessment tool for OC-capabilities

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The QROC Consortium consists of the following partners:

Participant No	Participant organisation name	Short Name	Type	Country
1	DUTCH INSTITUTE FOR TECHNOLOGY, SAFETY & SECURITY	DITSS	NPO	NL
2	NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO	TNO	RTO	NL
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## Definitions, Acronyms and Abbreviations

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ACRONYMS / ABBREVIATIONS	DESCRIPTION
CSA-Tool	Capability Self-Assessment Tool
IM	Innovation management
LEA	Law Enforcement Agency
NOC	National Operational Center
OC	Operational Center
SA	Situational awareness
QROC	Quick Response for Operational Centers

## Table of Contents

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Executive Summary .....	8
1 Introduction.....	9
1.1 Operational Centers .....	9
1.2 OC-Challenge: SA- and IM- capabilities .....	9
1.3 QROC-project: task 4.1 .....	10
1.4 The purpose of the CSA-Tool .....	10
1.5 Method of development the CSA-Tool.....	11
2 The logic behind the CSA-Tool .....	12
2.1 General logic .....	12
2.2 Situational Awareness Capabilities .....	13
2.2.1 Definition of SA-capabilities .....	13
2.2.2 Dimensions of SA-capabilities .....	14
2.2.3 Operationalisation of SA-capabilities.....	15
2.3 Innovation Management Capabilities .....	15
2.3.1 Definition IM-capabilities.....	15
2.3.2 Dimensions IM-capabilities .....	16
2.3.3 Operationalisation of SA-capabilities.....	17
3 The Capability Self-Assessment Tool: Overview .....	18
3.1 Overview to the CSA-Tool .....	18
3.2 Recommendations for conducting the self-assessment.....	20
3.2.1 Select a coordinator .....	20
3.2.2 Organise internal workshops to conduct the self-assessment.....	20
3.2.3 Organise internal workshops to interpret the results .....	20
3.3 Submitting the results for Task 4.2 within the QROC-project.....	20
4 The Capability Self-Assessment Tool: Detailed Guidelines .....	22
4.1 Fill out the preparatory questions (sheet 1) .....	22
4.1.1 Describe the country, involved disciplines and focus of the OC .....	23
4.1.2 Select a scenario .....	23
4.1.3 Selecting employees .....	24
4.2 Filling out the SA-and IM-items (sheet 2 & 3).....	25
4.2.1 Situational Awareness (sheet 2) .....	25
4.2.2 Innovation Management (sheet 3).....	26
4.3 Results (sheet 4).....	27
4.4 Interpreting the results (sheet 5) .....	28
4.5 Returning the (interpreted) results of the questionnaire.....	29
5 Reflection and recommendations.....	30
5.1 Reflection on CSA-Tool: application, validity and usability.....	30
5.2 Next steps to further validate and improve the CSA-Tool.....	30
5.3 Outlook within the QROC-project .....	31
6 Conclusions.....	32
References.....	33
ANNEX I - Analysis of SA-documents .....	35
ANNEX II - Analysis of IM-documents .....	37
ANNEX III – Operationalisation of SA-Capabilities.....	40
ANNEX IV – Operationalisation IM-capabilities.....	43

## List of Figures

---

Figure 1 - Relation between Innovation Management and Situational Awareness capabilities .....	12
Figure 2 - Effect level of IM- and SA capabilities and OC performance .....	13
Figure 3 - Overview conducting the Capability Self-Assessment .....	18
Figure 4 - Navigation pane for the supported Excel-document .....	20
Figure 5 - Flowchart components of CSA-Tool .....	22
Figure 6 - Preparatory questions-sheet .....	22
Figure 7 - Selecting the level of agreement for the SA-items .....	26
Figure 8 - Selecting the level of agreement for the IM-items .....	27
Figure 9 - Example of the results-sheet after filling in all the items.....	28
Figure 10 - Sheet with the guiding questions for interpretation.....	29

## List of Tables

---

Table 1 - Overview of SA-capabilities .....	14
Table 2 - Overview of IM-capabilities .....	16
Table 3 - Overview of steps within the CSA-Tool .....	19
Table 4 - Overview of respondent-groups for the CSA-Tool .....	24

## Executive Summary

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This report is the result of task 4.1 which is part the European 'Quick Response for Operational Centers'-project (QROC). It presents a Capability Self-Assessment Tool (CSA-Tool) for assessing the situational awareness capabilities, and innovation management capabilities of Quick Response for Operational centers (QROC). This CSA-Tool will be used in task 4.2 by (national) operational centers (OC's), in which they will assess two capabilities: their capabilities to build situational awareness, and their capabilities to change and innovate (i.e. innovation management).

With the CSA-Tool that is presented in the report, OC's will immediately gain a general understanding of how they are performing on these capabilities. Furthermore, the outcome of this CSA-Tool can serve as a starting point for future efforts to improve specific capabilities. The results of these assessments will be shared between the OC's participating in the QROC-project in order to learn and be inspired from each other. In the future, beyond this project, this may be the start of an international benchmark for OC's.

This report is interesting for different groups of readers:

- **For the review-commission of the EU-project.** This document is the result of task 4.1 and provides information about the development of the tool, the logic behind the tool and the tool itself.
- **For the OC's participating in task 4.2.** This report presents the CSA-Tool which will enable them to fulfill task 4.2 objectives.
- **For people who are responsible for managing / developing the situational awareness capabilities and / or innovation management capabilities of a QROC.** This report provides a tool which enables them to identify the current situation of a National Operational Center (NOC).

The structure of the report is as follows. **Chapter 1** describes the background and objective of the tool and provides a description of the CSA-Tool that has been developed. **Chapter 2** describes the basic logic behind the tool, and the definition of situational awareness capabilities and innovation management capabilities. The actual CSA-Tool - including the guideline of using this tool and the supporting excel tool - is presented in **Chapter 3 and 4**. **Chapter 3** contains a general overview of the CSA-Tool, and **chapter 4** contains the detailed step-by-step guidelines for conducting the self-assessment. In **chapter 5** we reflect upon the CSA-Tool and provide an outlook for using and (further) developing the CSA-Tool. The final **chapter 6** provides a conclusion to this report. In the appendices (I-IV) background information is provided about the development of the CSA-Tool.



# 1 Introduction

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The CSA-Tool is developed within the European 'Quick Response for Operational Centers'-project (QRoC). This chapter describes the background of developing the CSA-Tool, the project in which this tool is developed, the objective and target audience of the CSA-Tool and the method of development.

## 1.1 Operational Centers

Operational Centers (OC's) have the task to coordinate and facilitate emergency services to resolve crises or accidents. In doing so, OC's need to obtain enough information on the emergency at hand to fulfil their task as effective and efficient as possible. In general, an OC needs to execute the following tasks:

- Collect and analyse information;
- Continuous safety and security assessment;
- Performing risk assessments of potential situations and events;
- Take in emergency calls;
- Determine what emergency services need to be alarmed;
- Control, command and coordinate the activities of emergency services (based on SA).

These tasks are generally similar for all OC's. However, OC's in varying countries can be organised differently, for example in terms of operating regionally, nationally or cross-border, or in terms of what emergency services are coordinated by the OC.

## 1.2 OC-Challenge: SA- and IM- capabilities

One of the core practices and functions of an OC is to obtain and maintain a proper view of the (emergency) situation at hand (i.e. **Situational Awareness; SA**). Therefore, it can be important for OC's to frequently evaluate and monitor their SA-capabilities. Developing SA-capabilities is not just a matter of the procurement of new technologies, or the hiring of new staff. Often, OC capabilities need to be redesigned in a fundamental way, while sometimes completely new capabilities are required. This requires the strategic capability to change and innovate. Innovation is typically most successful if it is driven from within the (management of the) OC itself, but sometimes disruptive technologies require the aid of external stakeholders. The management of OC's need to know their capacity to change and innovate (i.e. **innovation management; IM**). In short, OC's need to possess adequate capabilities to build SA, but also to manage innovations to implement new technologies or processes to improve their SA.

Due to the digitalisation of society and organisations, the flows of information heavily increased over time. This trend has massive upsides, but simultaneously poses challenges how to process this increased stream of data. OC's rely on capabilities such as those related to situational awareness (e.g. monitoring of complex situations, localisation, identification), and the management of CBRN incidents (detection, containment, evacuation, etc.). It is obvious that the emergence of new technologies leads both to opportunities and risks for OC's: new technologies can help process this increased velocity and volume of data, whilst also providing new opportunities in gathering information that was previously harder (or even impossible) to collect. To help understand what technologies can be beneficial to invest in, it is important to assess the current state of the practices of the OC's.

### 1.3 QROC-project: task 4.1

The Quick Response for Operational Centers (QROC) project is an initiative of the Core group of the European Network of Law Enforcement Technology Services (ENLETS) and is funded by the Internal Security Fund of the European Commission. It runs from October 2019 until September 2021.

The QROC-project shares needs and best practices and increases the foresight regarding (the uptake of) new innovative technologies for operational centers to improve the public protection. To that aim, the QROC-project will build a communication capability between the Law Enforcement Operation Centers (OC) to share quickly and secure operational data across borders regarding terrorist threats to protect the public. Tangible results based on continuous testing of a new Capability Package (CP), self-assessment tool for OCs, demonstration of and innovative technologies, along with education and practical training via a series of tabletop exercises will increase the efficiency, and the capacity of (N)OC's.

Due to the interrelatedness of SA- and IM-capabilities, it is important to simultaneously evaluate the OC's performance in respect to these capabilities. To aid OC's assessing both capabilities, this task (T4.1) developed a CSA-Tool that can aid OC's in understanding what capabilities they can improve upon. Knowing the gaps in the capabilities, OC's could share this knowledge with other OC's and learn from and/or with each other. Based on the outcome of the assessment, law enforcement OC's learn what situational awareness capabilities can be improved upon, and how well equipped they are to improve these processes (innovation management capabilities; IM). A better understanding of OC's in respect to these capabilities can be used to identify technologies, and to specify and develop innovative use cases based on relevant technologies for OC's.

Therefore, the main task in 4.1 is to develop a Capability Self-Assessment (CSA) Tool to help OC's evaluate their current capabilities on innovation management and situational awareness. This tool aims to provide sufficient insight in these capabilities and thereby helping OC's to understand what capabilities they can improve upon (if any).

With this CSA-Tool that is presented in this report, OC's will immediately gain a general understanding of how they are performing on these capabilities. Further, the outcome of this CSA-Tool can serve as a starting point for future efforts to improve specific capabilities. The results of these assessments will be shared between the OC's participating in the QROC-project in order to learn and be inspired from each other. In the future, beyond this project, this may be the start of an international benchmark for OC's.

### 1.4 The purpose of the CSA-Tool

The CSA-Tool is a quick scan providing insight for OC's into their own capabilities to develop situational awareness (SA) and manage innovations (innovation management; IM). Based on this information, OC managers are able to decide whether they have to take measures to improve their SA- and IM-capabilities. The CSA-Tool helps to assess and if needed formulate measures to increase the performance of situational awareness (SA)- and managing innovations (IM)-capabilities of an operational centre. Based on this tool, an OC can assess these capabilities by themselves. Furthermore, the CSA-Tool enables OC's (nationally and internationally) to compare their capabilities so they can inspire and help each other improving these capabilities, for instance by sharing good practices.

The CSA-Tool consists of a **guideline** (process) and a supporting **Excel-document** enabling the user how to acquire relevant information about different dimensions of each of SA- and IM –capabilities of an OC, and to analyse and interpret this information. The output of the self-assessment should primarily lead to a better understanding of how OC's are performing on developing situational awareness and managing innovations, and to recognise which elements of these capabilities are currently of sufficient level and which require more effort. The self-assessment will generate a simple and concise overview of the status on different dimensions

of both capability categories. In addition, it will also be easy to compare the results of the self-assessments of different OC's. This can help OC's to share best practices and thereby help each other improve.

This tool provides information which is relevant for people who are responsible (often management on strategic / tactical level) for the performance (e.g. SA-capability) and development of OC's (e.g. via technological innovations).

## 1.5 Method of development the CSA-Tool

The CSA-Tool was developed through a series of research steps. First of all, the purpose of the tool was determined. The CSA-Tool is intended as a way for OC's to pinpoint what elements of SA and IM they can improve upon. By assessing a wide variety of SA- and IM-capabilities, OC's can perform a quick-scan of their current performance on these elements. Given this purpose and focus of the CSA-Tool, a **literature scan** has been conducted to determine what SA and IM capabilities should be incorporated in the CSA-Tool. This endeavour led to a wide variety of SA- and IM-models that all offer insight in what elements to incorporate in the CSA-Tool (see Annex I & II).

The first review within this research process was done by two participating LEA's in the QROC-project, who assessed an initial list of sub-capabilities that were intended to be incorporated in the CSA-Tool. After this review, the items (i.e. questions within the CSA-Tool) were developed. Where possible, the researchers re-used existing items that are available in the literature. If this was not the case, the researchers developed the items themselves, based on the models. Annex III and IV indicate which items were retrieved from existing models, but also which items were developed by the researchers. Parallel to the development of these items, the guidelines were drafted that could be used to fill out the CSA-Tool.

The second review that took place was done by three end-users and three experts from TNO. They were asked to provide feedback on the guidelines and the items for the different capabilities. Again, this feedback was taken into consideration to develop a final version of the CSA-Tool.

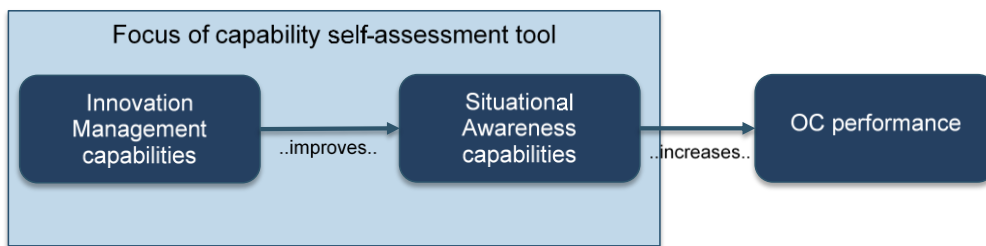
The following chapter (2) explains the basic logic behind the CSA-Tool.

## 2 The logic behind the CSA-Tool

This chapter describes the basic logic of the CSA-Tool and a conceptual definition of SA- and IM capabilities.

### 2.1 General logic

The performance of OC's depends heavily on their SA-capabilities. The continuance and rapid changes in the environment of OC's (e.g. in the field of technology) offers also opportunities to improve SA's effectivity and efficiency. Sometimes changes in the environment set new requirements to OC's (e.g. their SA-capability). For instance, citizens use social media more and more and for example expect that they can provide different information (e.g. also photos and videos) to operational centres also by social media (e.g. WhatsApp). Not fulfilling this requirement will reduce the performance of OC's. To recognise new possibilities on time and to create and implement the desired innovation, IM-capabilities are required. When OC's understand what capabilities can be improved (possibly by adopting new technologies), they consequentially need capabilities to manage these innovations and/or change their practices. In short, to increase an OC's SA (for instance by adopting new technology or processes), sufficient IM-capabilities are also necessary (see Figure 1).



**Figure 1 - Relation between Innovation Management and Situational Awareness capabilities**

The assumed relation between SA-capabilities and IM-capabilities on OC performance is described in the Figure 2 below.

		IM-Capabilities	
		low	high
SA-Capabilities	low	Low OC-performance	Low OC-performance ( <i>short term</i> ) Medium/ high OC-performance ( <i>long term</i> )
	high	High OC- performance ( <i>short term</i> ) Medium/ low OC-performance ( <i>long term</i> )	High OC-performance

**Figure 2 - Effect level of IM- and SA capabilities and OC performance**

We assume that if an OC has high SA-capabilities, it has positive effect on the OC’s performance (on the short term). However, in a situation where the IM-capabilities an OC is low, we assume that the OC’s performance will decrease in the long term. In situations where the IM-capabilities are high, we assume that an OC’s performance will stay stable or even improve in the long term. If an OC has low SA-capabilities, this has a negative effect on the OC’s performance (on the short term). If the IM-capabilities are also low, we assume that the OC’s performance will further decrease in the long term. In a situation where both the SA- and IM-capabilities of an OC is high, we expect that its performance will improve in the long term.

The CSA-Tool is focused on the assessment of the SA- and IM-capabilities. In the next sections, we provide conceptual clarity regarding both capabilities: the meaning and dimensions of situational awareness and innovation management.

## 2.2 Situational Awareness Capabilities

### 2.2.1 Definition of SA-capabilities

Endsley (1995) defines situational awareness as: “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future” (p.36). Based on this definition, the capability to develop situational awareness in the context of an OC can be described as: *the ability to collect and maintain complete and real time information of the emergency situation at hand, and can interpret this information to make decisions and actions to assist emergency services.*<sup>1</sup>

<sup>1</sup> In some models there is referred to as situation awareness instead of situational awareness. In this report will use the term situational awareness and means the same as situation awareness.

### 2.2.2 Dimensions of SA-capabilities

There are two dimensions of capabilities that determine to what extent an OC can build situational awareness. These are 1) **process capabilities** and 2) **enabling capabilities**. **Process capabilities** consist of six sub-capabilities, that together can help to inform decisions and actions:

- Information gathering;
- Information sharing;
- Information storage;
- Information integration;
- Information interpretation;
- Information projection.

Depending on the outcome of these decisions and/or actions, the information of these outcomes can loop back into the cycle again and the situational awareness can consequently be updated by an OC. The other dimension of SA-capabilities are the **enabling capabilities** which influence the way in which SA is built and maintained throughout this cyclical process. These enabling capabilities are:

- Task characteristics;
- Team characteristics;
- Systems;
- Organisation (design).

When handling an incident, different roles in an OC have different information and therefore different individual SA. In order to come to shared decision making, it is important to share individual SA between team members. Therefore, this instrument focuses on team SA. Team SA is defined as shared understanding of a situation among team members at one point in time and the process to come to a shared understanding (Salas et al. 1995 in Stanton et al. 2017: 452).

A number of measurement tools can be used to measure the establishment of situational awareness at a certain moment in time. These instruments, like SAGAT, measure SA as a state or a product. However, SA – needed for managing an incident – seems a continuous, complex and dynamic team process (Van Bezooijen & Essens, 2007) that changes constantly. Therefore, we focus on the processes of acquiring and maintaining team SA, instead of team SA as a product. The (communication) processes in a team are important for building and maintaining team SA. Different characteristics of the task, the team, systems and the organisation can influence these processes (Schraagen, de Koning, Hof, van Dongen, 2010). In order to measure the SA-capabilities, we looked into the SART (Taylor, 1990), SAnTE (Schraagen, de Koning, Hof, van Dongen, 2010) and SALIANT (Muñiz, Stout, Bowers, and Salas 1998) tools and created a more generalised list of items as provided in these tools to facilitate the measurement of SA enabling capabilities and SA process capabilities (see Table 1). This overview is based upon the analysis of multiple theoretical models on situational awareness. For an overview of these models, see Annex I.

**Table 1 - Overview of SA-capabilities**

SA enabling capabilities	Description
Task characteristics	Task characteristics (e.g. a high workload or high complexity of the task) may influence the process of building and maintaining SA.
Team characteristics	The characteristics of a team that influence the building and maintaining of (team) situational awareness. For example the type of leadership, the familiarity among the team members and the expertise of the team members.
Systems	The extent to which the operating systems advance the capability to create situational awareness. This is influenced by features such as the equipment status

	and the adequate operability of the provided tools (e.g. the presence of a shared display and the possibility to create a common operational picture).
Organisation (design)	The extent to which the organisational design advances the capability to create situational awareness. This is influenced by features such as the command and control structure, the goals that are set out and the division of the roles and tasks within the organisation.
<b>SA process capabilities</b>	<b>Description</b>
Information gathering	Perceiving the status, attributes and dynamics of task-related elements in the surrounding environment by collecting data from different sources.
Information sharing	Exchanging data and/or actionable information between various organisations, people and technologies both internally and externally. This capability runs through the other capabilities as it is part of an ongoing process.
Information storage	Storing, organising, labelling and/or classifying information. This capability runs through the other capabilities as it is part of an ongoing process.
Information integration	Consolidating and mapping the obtained data from different sources into a common operational picture to generate actionable information (i.e. a synthesis of the data).
Information interpretation	Conducting an assessment of the actionable information that was generated in Level 1 to comprehend the situation and to understand the significance of those integrated data elements on the desired goals or outcomes. This involves steps such as pattern recognition, interpretation and evaluation.
Information projection (anticipate) (Level 3)	The ability to project the future status of the environment based on the interpreted actionable information. This also entails anticipating and deciding upon which of the (possibly conflicting) interpreted actionable information the consequent decision making should be based.

### 2.2.3 Operationalisation of SA-capabilities

The dimensions presented in Table 1 are operationalised for the CSA-Tool. By means of this operationalisation, the CSA-Tool consists out of multiple items to measure the sub-capabilities for SA. Items are questions that can be responded to by the people filling out the CSA-Tool. The responses to these items will eventually lead to an overall score that provides an indication of the performance of the OC in respect to these capabilities. The items that are incorporated are either based upon existing items out of the studied theoretical models or developed by the researchers. Annex III provides an overview of the models used for the operationalisation.

## 2.3 Innovation Management Capabilities

### 2.3.1 Definition IM-capabilities

Innovation can refer to the implemented changes in processes, products, services, technologies and / or way of working that are new to an organisation, in this case the OC (also see De Vries, Bekkers & Tummers, 2016). We assume that innovation is not a goal in itself, it is a means of maintaining or improving operational



performance in the future. Innovation is not a one-off event, but a process. This process consists of a sequence of steps to move from an idea to *implementation* in the operation (innovation).

To be able to achieve the desired impact in an effective and efficient way with the innovations, it requires innovation management capabilities. This refers to ability of an organisation, department or operational centre to organise, manage and monitor innovation activities within an organisation. This also requires the ability to develop this capability in order to adapt to changes in the internal and external environment of the organisation.<sup>2</sup>

### 2.3.2 Dimensions IM-capabilities

This ability to innovate depends on eight sub-capabilities:

- Innovation strategy;
- Innovation processes;
- Innovation structure;
- Innovation culture;
- Innovation leadership;
- (innovation) resources;
- External network/ecosystem.

In Table 2 each sub-capability is described. This overview is based upon the analysis of multiple theoretical models on innovation management. For an overview of these models, see Annex II.

**Table 2 - Overview of IM-capabilities**

Capability	Description
Innovation strategy	The ability to create, implement and adapt an innovation strategy (e.g. vision, ambition, goals, approach and plans) that is clear, supportive and provides guidance for developing and implementing relevant innovation for the operation.
Innovation processes	The routines and the proficiency to conduct the key-innovation-activities such as searching, selecting, developing (e.g. experimenting or pilots), implementing and learning) in an effective and efficient manner.
Innovation structure	The ability to create and develop a structure - e.g. roles - (such as responsibilities or mandate), decision making-, coordination-, and communication-structures that support the innovation-activities for realising innovation ambitions.
Innovation culture	The ability to create and develop an innovation-oriented culture (e.g. space for creativity, openness to new ideas, risk taking, external orientation) that support and stimulate innovation.
Innovation leadership	The extent to which top- and middle- management are supported, are committed and are (actively) involved in the realisation of innovation ambition.
(innovation) resources	The availability of resources (e.g. people, finance, tools, systems and facilities) to conduct and organise innovation processes.

<sup>2</sup> For other definitions of innovation management, see Eveleens, C. (2010); Freeman et al. (2015); Ahmed & Sheperd (2010); Tidd et al. (2018); Trott (2016).



External network/ ecosystem	The ability of the organisation to develop and leverage an external ecosystem e.g. network of relevant partners (e.g. supplies, knowledge institutes, governmental organisation), innovation hubs (e.g. living labs,) that enable them to realise their innovation ambition.
Supportive capabilities	The ability to provide capabilities (e.g. portfolio management, knowledge management, sourcing management) that support innovation processes.

### 2.3.3 Operationalisation of SA-capabilities

The dimensions presented in Table 2 are operationalised for the CSA-Tool. By means of this operationalisation, the CSA-Tool consists of multiple items to measure the sub-capabilities for IM. Items are questions that can be responded to by the people filling out the CSA-Tool. The responses to these items will eventually lead to an overall score that provides an indication of the performance of the OC in respect to these capabilities. The items that are incorporated are either based upon existing items out of the studied theoretical models or developed by the researchers. Annex IV provides an overview of the models used for the operationalisation.

In the next chapter (3), the CSA-Tool will be presented.

### 3 The Capability Self-Assessment Tool: Overview

The upcoming two chapters (3 and 4) contain the Capability Self-Assessment Tool (CSA-Tool). The CSA-Tool consists of guidelines for how to conduct the self-assessment with the use of the supporting Excel-document. The Tool helps the OC to gain insight in respect to the performance of their SA- and IM-capabilities. Also, the tool will help to analyse and interpret the output of the tool. The self-assessment will generate a simple and concise overview of the status on different dimensions of both capabilities. This should lead to a better understanding by OC's of how they are developing situational awareness, and the extent they are able to manage innovations. Through these insights, OC's can recognise which elements of these capabilities are currently of sufficient level and which require more effort.

This chapter (3) provides an overview of the CSA-Tool and gives recommendations to the participating OC's, how to organise the self-assessment, and what should be done with the outcome of the self-assessment within the general process of the QROC-project. In the next chapter (4), a detailed guideline will be presented that helps to conduct the self-assessment of SA- and IM-capabilities. The following visualisation (Figure 3) shows the overview of conducting the self-assessment on SA- and IM-capabilities.

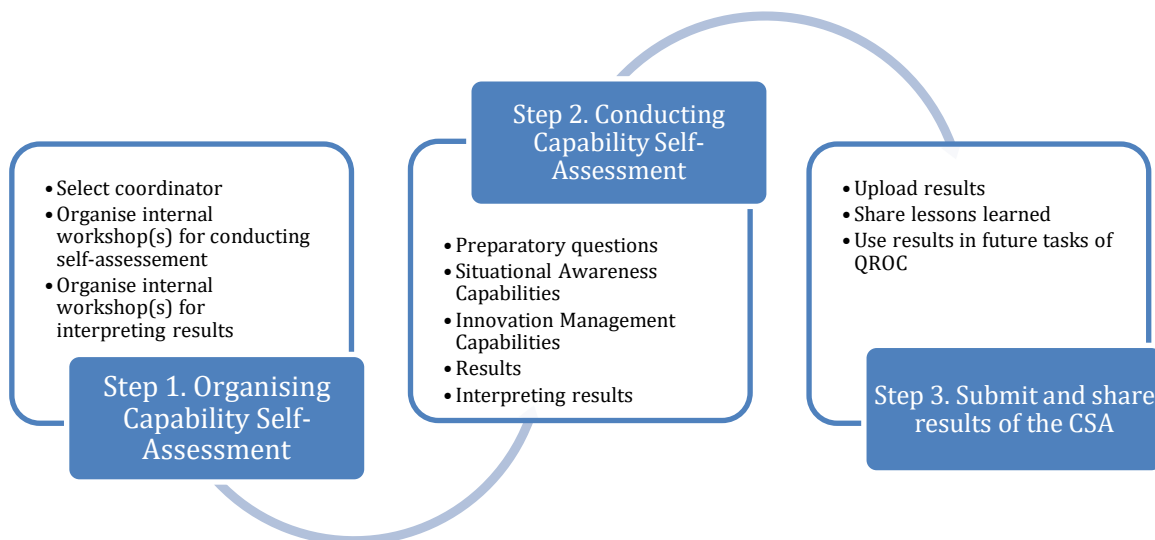


Figure 3 - Overview conducting the Capability Self-Assessment

#### 3.1 Overview to the CSA-Tool

The CSA-Tool consists of a set of questions that help OC's to gain insight in the performance of their SA- and IM-capabilities. In the supporting Excel-document, these questions are stated. In this Excel, the answers can be given by simply typing in the answers in their respective boxes, or by selecting an option from the drop-down menu when the question is posed in a multiple-choice format. By responding to these questions, an outcome will be produced that can be used as a starting point for a process to innovate or improve certain capabilities. The tool consists out of five parts. In the Table 3 below, an overview of these parts is presented. Hereby, the purpose and outcome of each step is described.

**Table 3 - Overview of steps within the CSA-Tool**

step	Purpose	Core activities in the step	Outcome
<b>1) Preparatory Questions</b>	This first set of questions are meant to prepare for the questions in the capability self-assessment tool, and to provide a scope for which the capability self-assessment tool will be filled out.	Answering the questions about the background of the OC that will be involved in the self-assessment process and based on which scenario the self-assessment will be conducted.	This leads to a description of the OC for which the self-assessment is conducted, the scenario that is selected, and what the roles and expertise are of the people involved.
<b>2) SA-Capabilities</b>	A list of statements (i.e. <i>items</i> ) concerning SA-capabilities is presented for which participants need to indicate the extent to which they agree with the each of the statements on a scale from 1 to 6. The items have to be filled out for a specific scenario (one of three scenarios provided) that might occur.	Providing answers to the items regarding the situational awareness capabilities of the OC.	This step results in a filled-out sheet in which all items for SA-capabilities are scored.
<b>3) IM-Capabilities</b>	A list of statements (i.e. <i>items</i> ) concerning IM-capabilities are presented for which participants need to indicate the extent to which they agree with the statement on a scale from 1 to 6. The items have to be filled out on a generic level, so not with a specific scenario in mind.	Providing answers to the items regarding the innovation management capabilities of the OC.	This step results in a filled-out sheet in which all items for IM-capabilities are scored.
<b>4) Results</b>	In this step of the CSA-Tool, the output of the questionnaire is presented.	Look at the depicted graphs and start with the interpretation of the results: what do we think of the results? Hereinafter, one can proceed towards the next step.	The responses to the questions for SA- and IM-capabilities will automatically lead to results that are displayed in a graph to give a clear overview of the status of both capabilities.
<b>5) Interpreting the results</b>	In this step, certain questions are posed to help OC's interpret the results and provide some remarks to why the outcome is a certain way, or to indicate what the key points of interest are of the OC for improving this capability. This step helps OC's to express what they are good at, but also what	Answering the questions that help to interpret the results: what are we good at and what do we want to improve? Are there any other remarks that should be made?	This step leads to the final outcome of the CSA-Tool: it provides an overview of how the OC is performing in terms of developing situational awareness and managing innovations, why this is the case, but also what

	capabilities require some attention.		point for improvement can be.
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Every part has its own sheet in the supporting Excel-documents (see Figure 4). By clicking on the sheets you are able to navigate through the different parts of the Excel, which are the parts of the CSA-Tool.

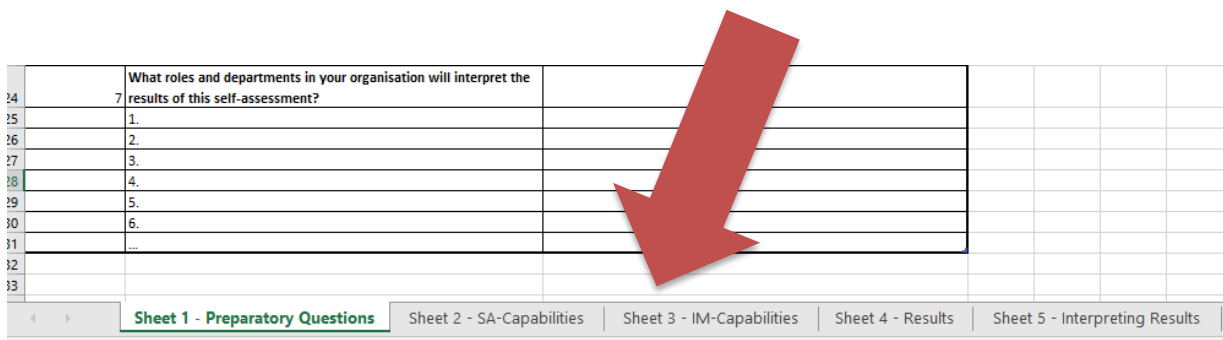


Figure 4 - Navigation pane for the supported Excel-document

### 3.2 Recommendations for conducting the self-assessment

#### 3.2.1 Select a coordinator

It is preferred that one person within a LEA is chosen to coordinate the task of filling out the capability self-assessment tool in the excel document. This person is responsible for organising that the right employees within the organisation are providing input to fill out the CSA-Tool, and that the output of the assessment is provided to the right people or unit(s) in the organisation.

#### 3.2.2 Organise internal workshops to conduct the self-assessment

The idea behind the self-assessment tool is that **per capability one value (between 1-6) needs to provided.** Hence, as probably multiple people need to be involved to respond to the items, it can be helpful to do this in a physical meeting. For instance, through a workshop, the coordinator can work together with experts to come to a consensus of a value between 1-6 for every item.

#### 3.2.3 Organise internal workshops to interpret the results

For the fifth step of this self-assessment, people need to be involved to interpret the results of the self-assessment. They should be able to express what the *good practices* of the OC are in respect to these specific capabilities, but also which capabilities they want to improve.

### 3.3 Submitting the results for Task 4.2 within the QROC-project

When the self-assessment has been completed (by going through the five steps of the CSA-Tool), the results can be returned to the leader of Task 4.2 within the QROC-project, by uploading them on the QROC-OneDrive.

By doing so, the task leader of 4.2 is enabled to analyse the results and to come to an overall comparison of the responses of the self-assessments that are conducted with the CSA-Tool. The report that will be written for Task 4.2 will be used for other tasks within the QROC-project (see 5.3 for the outlook within the QROC-project).

In the following chapter (4) a detailed guideline is presented for how to conduct the self-assessment.

## 4 The Capability Self-Assessment Tool: Detailed Guidelines

In this chapter a detailed guideline is presented to conduct the self-assessment. The chapter contains a step-by-step guideline that assists OC's in responding to the questions that are presented in the supporting Excel-document and thereby conducting the self-assessment. The flowchart below (Figure 5) shows the different components of the CSA-Tool on each sheet of the Excel-document.

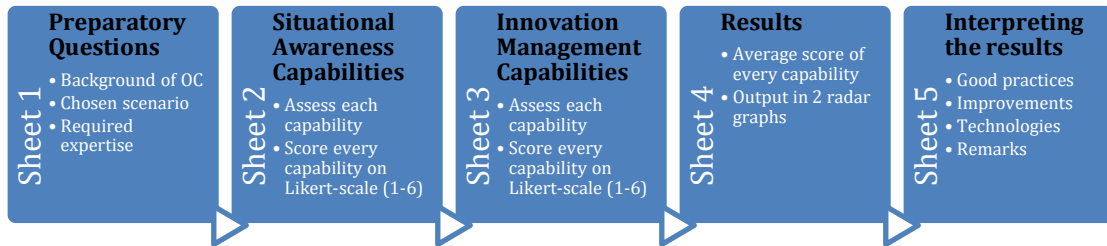


Figure 5 - Flowchart components of CSA-Tool

### 4.1 Fill out the preparatory questions (sheet 1)

In **sheet 1** of the excel document (see Figure 6), the **preparatory questions** are listed. This first set of questions is meant to prepare for the questions in the CSA-Tool, and to provide a scope for which the CSA-Tool will be filled out.

Preparatory Questions		
Question number	Question	Answer
1	In which country is the OC located?	
2	Which disciplines are operable under the OC? (e.g. police, fire department, ambulance)	
3	Can you describe the geographical focus of the OC? (e.g. regional/national/cross-border)	
4	Select a scenario (Public protection, Manhunt or CBRN)	
5	What are the the roles and expertise of the people that are delivering input to items for the situational awareness capabilities?	
6	What are the the roles and expertise of the people that are delivering input to items for the innovation management capabilities?	
7	What roles and departments in your organisation will interpret the results of the self-assessment?	

Figure 6 - Preparatory questions-sheet

#### 4.1.1 Describe the country, involved disciplines and focus of the OC

Please fill out what country the OC is located in, the disciplines that are involved, and what the geographical focus of the OC is (question nr. 1-3).

The first set of questions of sheet 1 'preparatory questions' is to provide some information on the OC for which the CSA-Tool will be filled out. This helps to interpret the results and to compare the results later on in the QROC-project. Please fill out the following:

- In what country the OC is located;
- What disciplines are involved in the OC (e.g. police, fire department, ambulance);
- What the geographical focus of the OC is (e.g. regional or national).

#### 4.1.2 Select a scenario

Please fill out your choice for the scenario that will be used for the self-assessment (question nr. 4).

The second set of questions of sheet 1 'preparatory questions' is about determining a scenario. The coordinator needs to determine for what scenario the CSA-tool will be filled out. The scenario determines what (level of) OC(s) are involved, but also what emergency services need to be alarmed in the process. Thus, this can provide direction what expertise is required, what functions the OC has in this specific scenario, and what parties need to be involved. This should be made explicit in order to be able to compare these assessments with other organisations (when filling it out for a similar scenario), or to assess whether the OC has improved certain capabilities. In the context of the QROC-project, three scenarios have been developed that can be used to fill out the capability self-assessment tool. A full description of these scenarios are being developed in Task 5.1 of the QROC-project. For this self-assessment, an initial version of the scenarios can be used. See document 'QROC Initial Scenarios Proposal' on the QROC OneDrive, under WP4.

The scenarios that will be used in the QROC-project are:

- Public protection / crowd management;
- Manhunt;
- CBRN attack.

Please note that the scenarios are only important to assess the SA-capabilities of an OC: these can help to put the items into context: how good is our OC in SA-capability X in the context of a manhunt-scenario. We assume that these capabilities will not differ heavily per scenario, but for the comparability of the results it is beneficial to make these scenarios explicit. The scenarios do not have to be taken into consideration when assessing the IM-capabilities of a LEA / OC, as this is not dependent on a specific emergency or situation context.

There are multiple rationales for selecting the scenarios:

- 1) The scenario selection can be based on the (national) OC that assessing their SA-capabilities. Some scenarios are more suitable to audit for a national OC, whilst other scenarios are more applicable for a regional or local OC. This is dependent on how the OC(s) of a country is/are organised;
- 2) The scenario selection can be based on a scenario that is most applicable to the context of a country or region. It can be the case that some scenarios are less or more applicable than others;
- 3) If one if the scenario's is similar to an event that actually occurred in your country, it can be useful to select that one and work from the actual experiences.

### 4.1.3 Selecting employees

Please fill out the role and/or function/expertise of the employees that are delivering input to the capability self-assessment tool (question nr. 5-7).

The third set of questions in sheet 1 ‘preparatory questions’ is about selecting the right employees. When determining for what scenario(s) the CSA-Tool will be filled out, the coordinator needs to select the employees that have the right knowledge and / or expertise to provide sufficient input to the questionnaire. The tool focuses on SA- and IM-capabilities which are potentially present in different organisational levels, departments and / or people.

There are two respondent-groups identified for the CSA-Tool: the respondent-group that needs to fill out the questionnaire, and the respondent group that is responsible for interpreting the results. Table 4 provides a description of these respondent-groups. Possibly, this requires specific expertise and / or knowledge that is probably distributed amongst different people and levels in an OC. Since the structure of OC’s differs per country, the required expertise is formulated on a functional level instead of referring to specific departments of an OC.

**Table 4 - Overview of respondent-groups for the CSA-Tool**

Filling out the self-assessment tool			
	Respondent-group	Explanation	The people that need to provide input to the assessment-tool should be able to provide information on...
Assessing the SA-capabilities of an OC	The tactical level of the respective OC	The tactical level of an OC can be regarded as the coordinator of the operational level and activities of the OC. Ideally, the tactical level has an overview of the wide range of tasks that needs to be executed by the OC before, during or after an emergency.	... how the OC is currently developing situational awareness when there is an emergency.
Assessing the IM-capabilities of an OC and/or LEA	The strategic level of a LEA.	Innovation management needs to be assessed on the level of the LEA: how well equipped is the complete organisation to develop, manage and /or implement new technologies and processes?	... how well the OC is managing innovations and change within an organisation. This contains both technological and procedural innovations or changes.
Interpreting the results	The tactical and strategic level of an OC and/or LEA	It needs to be assessed why the score turned out a certain	... why the OC is performing in a certain way, what the good



of the CSA-Tool		way: what are we doing well in respect to this capability, and also what points of improvement do we foresee for further improving our capabilities?	practices are, and which points for improvement can be pinpointed.
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It is possible that different people need to provide input to the self-assessment tool. For instance, the people that can assess the SA-capabilities might be different from the ones that can also interpret the outcome of the self-assessment and reflect on the results. Hence, the coordinator can decide to fill out these parts of the CSA-Tool in separate sessions (e.g. workshops) with the respective people. The coordinator can do this by already looking to all the questions that are incorporated in the Excel-document to determine who to involve in which phase of the self-assessment. If necessary, the partners involved in Task 4.2 can be consulted for this matter.

## 4.2 Filling out the SA-and IM-items (sheet 2 & 3)

After the preparatory questions in sheet 1, the SA and IM items can be filled out in sheet 2 and sheet 3. This can be done by involving the right people and expertise within the OC, to ensure that the self-assessment is done as precisely and accurately as possible. Depending on the items that are filled out (SA or IM), different people might be needed. This might also require that the SA- and IM-items are filled out in separate sessions or meetings (also see 3.2).


### 4.2.1 Situational Awareness (sheet 2)

Please score all the items regarding the SA-capabilities for the capability self-assessment tool, by using the dropdown menu in the column behind the items.

In sheet 2, the questionnaire for the Situational Awareness Capabilities is listed. With the chosen scenario in mind, the items for the different SA-dimensions can be filled out. Hereby, the coordinator should ensure that all items are scored on a Likert-scale from 1 to 6 (DeVellis, 2017):

- 1 = completely disagree
- 2 = moderately disagree
- 3 = mildly disagree
- 4 = mildly agree
- 5 = moderately agree
- 6 = completely agree

It is important to think in a hypothetical manner about the scenario: if this scenario would occur, how good would we be at....? For a description for the (sub-)capabilities of situational awareness, see section 2.2.

The figure below illustrates what 'cells' of the SA-capabilities sheet needs to be filled out in this phase. Use the -icon to access the dropdown menu (Figure 7).

Situational Awareness Capability Assessment		
Picture that the chosen scenario actually happens and answer the questions below.		
SA enabling capabilities	Items (totally disagree – totally agree)	Please select level of agreement*
	Considering the chosen scenario:	Considering the chosen scenario:
Task characteristics	The tasks that have to be performed in this scenario are complex	
	The workload of team members is high during this scenario	
Team characteristics	Team members have the right expertise to carry out the tasks	
	The team leader has the right expertise to carry out his/her task	
	Team members have insight in each other's information needs	
	Team members have a shared situational awareness of the goals to be achieved	
Systems	Our tools facilitate the gathering of relevant information to build situation awareness	
	Our tools facilitate the storing of relevant information	
	Our tools facilitate the sharing of relevant information between team members	
	Our tools facilitate the displaying of relevant information to support our team decision making	



Figure 7 - Selecting the level of agreement for the SA-items


### 4.2.2 Innovation Management (sheet 3)

Please score all the items regarding the SA-capabilities for the capability self-assessment tool, by using the dropdown menu in the column behind the items.

In sheet 3, the questionnaire for the Innovation Management Capabilities is listed. These capabilities need to be filled out on a generic level. The people involved need to reflect on their innovation management processes and determine to what extent they are able to adequately manage innovations in their OC. Hence, the people that need to be involved should have a stake or role in the OC's innovation process in order to evaluate these capabilities. Similar as with scoring the SA-capabilities, the coordinator should ensure that all items are scored on a Likert-scale from 1 to 6 (DeVellis, 2017):

- 1 = completely disagree
- 2 = moderately disagree
- 3 = mildly disagree
- 4 = mildly agree
- 5 = moderately agree
- 6 = completely agree

For a description for the capabilities of innovation management, see section 2.3. It is important to assess the innovation management capabilities on a more general level of the OC (this has no direct relation to the selected scenario).

The figure below illustrates which 'cells' of the IM-capabilities sheet 3 needs to be filled out in this phase. Use the -icon to access the dropdown menu (Figure 8).

Innovation Management Capability Assessment		
Please answer the following questions from a general point of view		
Capability	Items	Please select level of agreement*
Innovation strategy	Our innovation goals and strategy is well defined; e.g. we have defined clear areas for innovation within each operational task	
	Our innovation strategy is clearly communicated so everyone knows the targets for improvement	
	We look ahead in a structured way (using forecasting tools and techniques) to try and imagine future threats and opportunities	
	Our innovation strategy is aligned with strategic ambitions of the organization	
	The realization of the innovation strategy is monitored and evaluated annually	
	We have processes in place to help us to manage innovation effectively from idea to implementation	
	We systematically search for innovation ideas	
	Our innovation projects are usually completed on time and within budget	
	We have effective mechanisms to make sure everyone in the process of innovation understands the user needs	
	We have effective mechanisms for managing process change from idea through to successful implementation	

\* Level of agreement is scored on a scale from 1 to 6:

1 = completely disagree

2 = moderately disagree

3 = mildly disagree

4 = mildly agree

5 = moderately agree

6 = completely agree

Figure 8 - Selecting the level of agreement for the IM-items

### 4.3 Results (sheet 4)

Read your output of the questions answered on sheet 4.

In sheet 4, the output of the questions is displayed. With these insights, the people that are identified in the preparatory phase can follow up on these results and determine to what extent the OC needs to improve their capabilities, and if so, how they can do that.

The output of the questionnaire is presented in two radar-graphs. In these graphs the average score of every capability is visually depicted (see Figure 9). This can help to identify to what extent an OC already develops capabilities to build SA or manage innovations. A score between 4 and 6 implies that the OC already possesses (to some extent) the capability, whilst a score of 1-3 implies that the OC has (to some extent) not yet developed the capability. Hence, this might be an indication for the OC to improve this capability (or part of it). This is similar for both SA- and IM-capabilities.<sup>3</sup>

Sheet 4 ‘results’ contains two visualisations of the output of the self-assessment tool (see Figure 9 for an example). The two tables on the left side on the self-assessment tool give a numerical representation of the results. The right side is a graphical representation of the results.

<sup>3</sup> The scores on every dimension (SA) or sub-capabilities (IM) are an average of the scores for the items that belong to these dimensions or sub-capabilities.

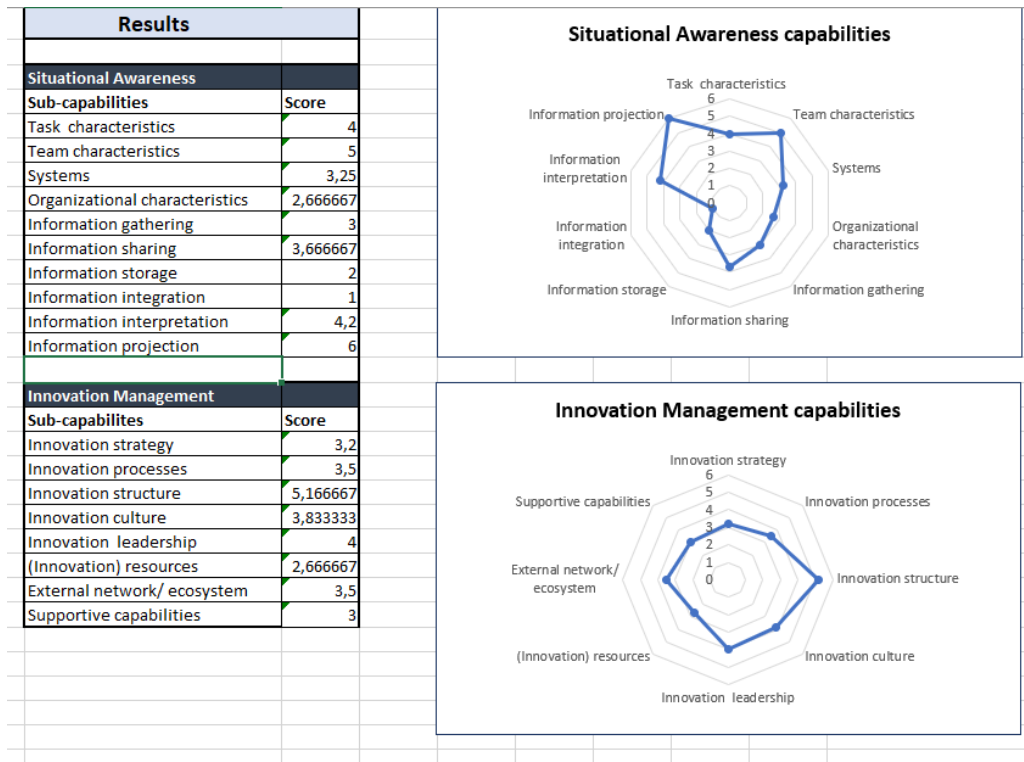


Figure 9 - Example of the results-sheet after filling in all the items

#### 4.4 Interpreting the results (sheet 5)

Please answer the interpretative questions for each sub-capability by entering text in the respective cells.

The purpose of sheet 5 ‘interpreting the results’ is to identify good practices and chances for improvement. Based on the output of the self-assessment, it can be determined what capabilities are already developed to a certain extent, but also what capabilities require additional attention for the future. This might require looking back to the items that are answered when assessing a capability. For example, when there is a relatively low score on the SA-capability ‘systems’, then it might be interesting to look back to the SA-capability sheet 2 to take another look at the items that are part of this capability. What would I want to focus on? Also, in sheet 5 remarks can be made on the *good practices* of the OC in respect to certain capabilities. Furthermore, it can be identified what technologies might be relevant to improve certain SA-capabilities. This can be useful in a later stage in the QROC-project. Finally, there are also designated cells for any other additional remarks in respect to any capability.

These interpretative questions are stated in the fifth sheet of the Excel-document (see Figure 10).

Situational Awareness		What are <i>good practices</i> you can share in respect to this capability ?	What do you want to improve in respect to this capability?	What kind of technology do you think can be beneficial to improve this situational awareness capability?	Additional remarks
Dimension	Score				
Task characteristics	4				
Team characteristics	3				
Systems	3,25				
Organizational characteristics	2,666667				
Information gathering	3				
Information sharing	3,666667				
Information storage	2				
Information integration	1				
Information interpretation	4,2				
Information projection	6				
Innovation Management					
Subcapabilities	Score			N/A	
Innovation strategy	3,2			N/A	
Innovation processes	3,5			N/A	
Innovation structure	5,166667			N/A	
Innovation culture	3,833333			N/A	
Innovation leadership	4			N/A	
(Innovation) resources	2,666667			N/A	
External network/ ecosystem	3,5			N/A	
Supportive capabilities	3			N/A	

Figure 10 - Sheet with the guiding questions for interpretation

## 4.5 Returning the (interpreted) results of the questionnaire

After finalising the self-assessment and interpreting the results, the outcome can be returned to the leader of task 4.2. Please upload your filled in Excel on the designated shared file on OneDrive of the QROC project (04 WP4 – 01 Deliverables – D4.2). With this input, a report can be developed in which the results of the CSA-Tool are being described. The report can provide input to future tasks within the QROC-project. See section 5.3 for a more detailed description of the outlook of the self-assessments done with the CSA-Tool.

## 5 Reflection and recommendations

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This chapter reflects upon the application and usability of the developed CSA-Tool and provides suggestion for using and further development of the CSA-Tool.

### 5.1 Reflection on CSA-Tool: application, validity and usability

The CSA-Tool provides a quick scan on information about the SA- and IM-capabilities of an OC and the possibility to compare the results from other OC's. It provides insights how the respondent score, the different dimensions of each capabilities. This overview is mostly useful as a first exploration of the level of each dimension of SA- and IM-capabilities. This quantitative approach can be used as a starting point for a more in-depth (qualitative) assessment of certain capabilities (e.g. the ones where an OC scores relatively low). The CSA-Tool is not intended to gain an in-depth understanding of how the performance capabilities come to fruition. Hence, if OC's decide to improve certain capabilities, they could choose to engage in a more in-depth research on the elements of SA or IM that they scored lower on and reflect on what to develop in the future.

The conceptualisation and operationalisations of SA- and IM-capabilities are based on scientific literature. With this the researchers captured the IM capabilities concept as a whole. A conceptualisation applied specifically to OC's does not exist. The researchers have applied the exiting conceptualisation of SA- and IM-capabilities towards the OC context. We have not reflected upon the output with practitioners of OC's.

The operationalisations of SA- and IM-capabilities in items are based on prior formulated theses and also applied to OC context. The researchers used as often as possible items of existing questionnaires and scales -which are validated-, to ensure that the items correctly measure the construct of interest (DeVellis, 2017). Furthermore, the theses are reviewed by both experts of TNO and some end-users to ensure that they are comprehensive and unambiguous. Three of the participating end-users in the QROC-project (i.e. LEA's) were involved in this iterative process. They were mainly asked to indicate whether the manual and the items in the CSA-Tool were clear. Three TNO-experts were asked to review the items on completeness and clarity. With the feedback of both the LEA's and the experts provided, the manual and CSA-Tool were improved.

### 5.2 Next steps to further validate and improve the CSA-Tool

By using the CSA-Tool and reflecting on the process of conducting the assessment, the results and the formulated theses, provide the possibility to further develop the CSA-Tool in the future and improve the validity and usability. Hence, during task 4.2 ('Execute self-assessments and international comparison'), the LEA's should be adequately supported when questions arise during the self-assessment and lessons learned will be adopted to the CSA-Tool. Some steps can be taken for future research to further improve and validate the CSA-Tool. First of all, a factor analysis (DeVellis, 2017) of the items should be done to ensure that the items are measuring the intended / right construct. Second, in task 4.2 of the QROC-project the CSA-Tool will be used by the participating OC's to assess their SA- and IM-capabilities. Hence, by collecting feedback on the CSA-Tool, the tool can be further improved and adapted. Third, also another format can be used for the CSA-Tool. Currently, -due to time constraints-, a MS Excel is used for the tool. However, other software and formats can also be explored for use in future versions of the CSA-Tool. This should then ultimately lead to a more intuitive version of the CSA-Tool.

### **5.3 Outlook within the QROC-project**

The outcome of this CSA-Tool can be used beyond the context of the QROC-project (e.g. to improve capabilities by implementing new technology), but will also play a role within the other QROC tasks and work packages. Especially the other tasks within WP 4 can build upon the results of the CSA-Tool.

In task 4.2, participating LEA's / OC's will fill out the CSA-Tool. They will become directly aware of the results, and understand how these have come to fruition. These results will be combined and compared on a generic level, so that the LEA's / OC's can learn from one another. In the future, beyond this project, this may be the start of an international benchmark for (N)OC's.

In task 4.3, a market scan will be executed for relevant technologies. This will at least address the technologies of 5G, autonomous drones and video and data management systems. The SA-capabilities that are incorporated in the CSA-Tool will guide this market scan. Based on both the outcome of task 4.2 and 4.3, task 4.4 will develop use cases for relevant technologies for OC's to improve their capabilities.

## 6 Conclusions

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This report describes the results of task 4.1 of the QROC-project. Within this task, a self-assessment tool (i.e. the Capability Self-Assessment Tool or CSA-Tool) has been developed. that the tool assists OC's in assessing two core capabilities: capabilities to build situational awareness (SA) and capabilities to change and innovate (innovation management or IM). On the basis of a literature scan of relevant models on SA and IM, the main sub-capabilities of SA and IM have been identified. The sub-capabilities for IM included in the CSA-Tool are:

- Innovation strategy;
- Innovation processes;
- Innovation structure;
- Innovation culture;
- Innovation leadership;
- (innovation) resources;
- External network/ecosystem.

The SA-capabilities of an OC are divided into two dimensions, each consisting of multiple sub-capabilities:

- **Process capabilities**, consisting out of six sub-capabilities:
  - o Information gathering;
  - o Information sharing;
  - o Information storage;
  - o Information integration;
  - o Information interpretation;
  - o Information projection.
- **Enabling capabilities**, consisting out of four sub-capabilities:
  - o Task characteristics;
  - o Team characteristics;
  - o Systems;
  - o Organisation (design).

These sub-capabilities are operationalised into items (i.e. questions/statements) that OC's can score to conduct their self-assessment. These items are presented in the supporting excel tool, which can be filled out by following the overview and guidelines that are presented in this report (Chapter 3 and 4). By using the CSA-Tool, OC's gain a general understanding on how they are performing on these capabilities. This can help them determine what (sub-)capabilities they can further develop both within the QROC-project, but also beyond the scope of this project.



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## ANNEX I - Analysis of SA-documents

Source	Schraagen et al (2010)	Endsley (1995)	Stanton et al. (2017)	Salmon et al (2009)
Focus/scope	Development of an instrument to measure team situational awareness (TSA).	Theoretical model of situational awareness	Review of SA models (divided into individual SA, team SA and systems SA)	Comparison of SA measurements
Document type	Article	Article	Literature review	Article
Operationalisation of constructs available?	Yes	No	No	Yes
Dimensions of SA	<b>Input</b> Team factors	<b>Input</b> <b>Individual factors</b> , e.g. goals, knowledge, training.  <b>Task &amp; environmental factors</b> , e.g. workload, stressors, system design	<b>Individual</b> Dimension/cognition (SAGAT probes). Perception of elements, comprehension of meaning and projection of future status. Endsley.	Three measurements, each measures different constructs.
	<b>Process</b> Building a picture of the situation, Level 1 Endsley Building a picture of the situation, Level 2 and 3 Endsley Sharing a picture of the situation Heedful interrelating	<b>Process</b> Perception (level 1) Comprehension (level 2) Projection (level 3)	<b>Team</b> Dimension (information sharing). Shared understanding of a situation among team members at one point in time.	SAGAT – measures task specific elements (e.g. location, of schools, roads)  SART – generic questions about the situation (complexity of situation) and cognitive capacities (e.g. attention)
	<b>Output</b> Team situation awareness Team results	<b>Output</b> Decision Performance of action	<b>System</b> Dimension (distributed cognition, internal information processing and sharing). Activated knowledge for a specific task within a system which relates to the state and	CDM probes -  Questions about Information elements necessary for task performance (e.g. what was the most important piece of information that you used to formulate the decision?)

			developments of the environments.	
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## ANNEX II - Analysis of IM-documents

Source	Adams et al. (2006)	Cormican & O'Sullivan (2004)	Diaz-Molina et al. (2014)	Diedrichs et al. (2006)	Loewe et al. (2006)	Martensen et al. (2007)	Schentler et al. (2010)
Focus/ scope	Innovation management Private organisations	Product innovation management Private organisations	Innovation management Private organisations	Innovation management consulting approaches Private organisations	Innovation capabilities Private organisations	Innovation excellence Private organisations	Innovation management Private organisations
Document type	Scientific journal Review	Scientific journal Empirical research	Rapport Literature	EU rapport	Scientific Journal	Scientific rapport	Scientific rapport
Operationalisation of constructs available?	No	Yes	Yes	No	Yes	Yes	No
Dimensions of IM	Innovation strategy(strategic orientation; strategic leadership)  Organisation and culture (culture; structure)  Portfolio management (risk/return balance; optimisation tool)  Project Management (project efficiency,	Leadership & culture  Product strategy & portfolio management  Market analysis & Customer driven requirements  Project planning & selection  Communication & cross functional integration	Leadership Strategy  Organisation People  Key assets management  Knowledge management  Value chain management  Innovation processes  Results	Innovation strategy  Innovation organisation and culture  Innovation life cycle management  Organisational structure  Resources skills (links) with outside people	Leadership & organisation  Process & tools	Leadership Innovation process  People  Partnership and resources  Strategies & plans  Customer orientation	Innovation strategy & portfolio  Innovation culture  Innovation structure  Innovation competencies & Learning

	tools, communication, collaboration)  Commercialisation (market research, market testing, marketing sales)		Culture				
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Source	Vos et al. (2017)	Meijer (2019)	Bagno et al. (2017)	Ernst et al. (2019)	Van Emden (2014)	Lewis et al. (2018)
Focus/scope	Public organisation (Defense, Law enforcement)	Public innovation capacity (government)	Models for innovation management	Technologisch innoveren in politieorganisaties (Dutch publication)	Innovatiemanagements standaard (BIT-model)	Innovation in the public sector
Document type	Scientific Rapport Review	Theoretical research (applied)	Literature review	Scientific rapport Literature review		Scientific journal Empirical research (survey)
Operationalisation of constructs available?	Yes	Yes	No	Yes	Yes	Yes
Dimensions of IM	Innovation strategy  Supportive organisation (structure, culture & leadership)  Resources (e.g. tools, budget, people)  Innovation processes  External network (e.g. partnerships)	Mobilisation  Experimenting  Institutionalising  Balancing  Coordinating  Innovation leadership	Capability centred models:  Innovation strategy  Creation/recognition  Elaboration/articulation of opportunities (conceptualisation)  Dissemination  Implementation and learning	Doelstellingen/aanpak  Draagvlak  Samenwerking  Organisatiecultuur  Leiding/management  Facilitering  Werving/training  Organisatiestructuur  Techniek	Culture  Processes  Monitoring & measuring  Improvement  Resources  leadership	Innovation drivers (structures, processes and contextual factors that help/hinder innovation)  Networking (the frequency of communication external to the organisation)  Leadership (qualities and capabilities of senior individuals)



	Supportive capabilities (e.g. project management)					within the organisation)
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## ANNEX III – Operationalisation of SA-Capabilities

Source	SANte Measurement tool	SALiant Measurement tool (Muñiz et al. 1998)	SART Measurement tool (Taylor et al. 1990)	Self-developed Items	Incorporated Items
<b>SA enabling capability</b>					
Task characteristics			The tasks that have to be performed are complex The workload of team members is high		The tasks that have to be performed in this scenario are complex The workload of team members is high during this scenario
Team characteristics	Team members have the right expertise to carry out the tasks The team leader has the right expertise to carry out his/her task Team members have insight in each other's information needs Team members have a shared situation awareness of the goals to be achieved <sup>4</sup>				Team members have the right expertise to carry out the tasks The team leader has the right expertise to carry out his/her task Team members have insight in each other's information needs Team members have a shared situational awareness of the goals to be achieved
Systems				Our tools facilitate the gathering of relevant information to build situational awareness Our tools facilitate the storing of relevant information Our tools facilitate the sharing of relevant information between team members Our tools facilitate the displaying of relevant information to support our team decision making	Our tools facilitate the gathering of relevant information to build situational awareness Our tools facilitate the storing of relevant information Our tools facilitate the sharing of relevant information between team members Our tools facilitate the displaying of relevant information to support our team decision making

<sup>4</sup> Originally framed as an 'output' item in the SanTe measurement tool.





Organisational characteristics	The organisational structure (command structure) is clear  Within the team it is clear how tasks and roles are divided  Presence of standard operating procedures				The organisational structure (command structure) is clear  Within the team it is clear how tasks and roles are divided  We have standard operating procedures to deal with this scenario
SA process capability					
Information gathering	Team members actively seek further information to extend the picture of the situation  Team members assess whether information is factually correct	Team members obtain sufficient information of what is happening  Team members continuously monitor the situation via various sensors or sources of information			Team members continuously monitor the situation via various sensors or sources of information  Team members actively seeks further information to extend the picture of the situation  Team members assess whether information is factually correct
Information sharing	Team members pass relevant information to each other within a timely manner before being asked	Team members inform each other when relevant actions are taken  Team members frequently brief each other about the status of the incident			Team members pass relevant information to each other within a timely manner before having to be asked  Team members inform each other when relevant actions are taken  Team members frequently brief each other about the status of the incident
Information storage	Information is stored and organised in a structured way (e.g. in an information system)				Information is stored and organised in a structured way (e.g. in an information system)
Information integration				We use a structured approach to integrate information for collaborative decision making	We use a structured approach to integrate information for collaborative decision making
Information interpretation	Team members pose critical questions to clarify the goal and the tasks to be accomplished  Team members verify that information sent was interpreted as intended	Team members confirm information when possible, challenge information when doubtful  Team members attempt to determine the cause of discrepant information			Team members confirm information when possible, challenge information when doubtful  Team members attempt to determine the cause of discrepant information



		Team members include all information rather than fixating on one item or event			<p>Team members include all information rather than fixating on one item or event</p> <p>Team members pose critical questions to clarify the goal and the tasks to be accomplished</p> <p>Team members verify that information sent was interpreted as intended</p>
Information projection	Team members form an impression of how the situation will develop	Team members anticipate consequences of actions and decisions			<p>Team members form an impression of how the situation will develop</p> <p>Team members anticipate consequences of actions and decisions</p>

## ANNEX IV – Operationalisation IM-capabilities

Source	Tidd et al. 2018	Cooper et al. (1996)	Diedrichs et al. (2006)	Chiesa et al. (1996)	Adams et al. (2006)	Cooper et al. (1996)	Durst en Stähle (2013)	Loewe en Dominiquini (2006)	Cormican en O'Sullivan (2004)	Incorporated items
<b>IM capability</b>										
Innovation strategy	<p>People have a clear idea of how innovation can help us to compete</p> <p>Our innovation strategy is clearly communicated so everyone knows the target for improvement. We look ahead in a structured way (using forecasting tools and techniques) to try and imagine future threats and opportunities and the overall strategy of the business</p> <p>We have processes in place to review new technological or market developments and what they mean for our firm's strategy</p>	Clearly defined areas for innovation	<p>Het verkennen van externe ontwikkelen en analyseren kansen en dreigingen voor organisatie</p> <p>The realisation of the innovation strategy is monitored and linked to the strategic goals.</p>							<p>Our innovation goals and strategy is well defined; e.g. we have defined clear areas for innovation within each operational task</p> <p>Our innovation strategy is clearly communicated so everyone knows the targets for improvement</p> <p>We look ahead in a structured way (using forecasting tools and techniques) to try and imagine future threats and opportunities</p> <p>Our innovation strategy is aligned with strategic ambitions of the organisation</p> <p>The realisation of the innovation strategy is monitored and evaluated annually</p>
Innovation processes	<p>We have processes in place to help us manage innovation effectively from idea to launch</p> <p>Our innovation projects are usually completed on time and within budget</p> <p>We have effective mechanisms to make sure everyone (not just marketing) understands the customer needs.</p> <p>We have effective mechanisms for managing process change from idea</p>									<p>We have processes in place to help us to manage innovation effectively from idea to implementation</p> <p>We systematically search for innovation ideas</p> <p>Our innovation projects are usually completed on time and within budget</p> <p>We have effective mechanisms to make sure everyone in the process of innovation understands the user needs</p> <p>We have effective mechanisms for managing process change from idea through to successful implementation We have mechanisms in place to ensure early</p>



	<p>through to successful implementation</p> <p>We systematically search for innovation ideas</p> <p>We have mechanisms in place to ensure early involvement of all departments in developing new products/ processes</p> <p>We have a clear system for choosing innovation projects</p> <p>There is sufficient flexibility in our system for product development to allow small fast track project to happen</p> <p>Learning:</p> <p>There is a strong commitment to training and development of people</p> <p>We take time to review our projects to improve our performance next time</p> <p>We learn from our mistakes</p>									<p>involvement of all relevant departments in developing innovation</p> <p>We have a clear system for choosing innovation projects</p> <p>There is sufficient flexibility in our system for innovation development to allow fast track projects to happen</p> <p>We monitor each activity in the innovation process (e.g. idea generation, experimentation and implementation) structurally as well as the flow in the whole innovation process</p> <p>We learn from our mistakes</p>
<p>Innovation structure</p>	<p>Our organisation structure does not stifle innovation but helps it to happen</p> <p>People work well together across departmental boundaries</p> <p>People are involved in suggesting ideas for improvements to products or processes</p> <p>Our structure helps us to take decisions rapidly</p> <p>Communication is effective and works top down, bottom</p>									<p>Our organisation structure does not stifle innovation but helps it to happen</p> <p>Employees within our organisation are involved in suggesting ideas for improvements to products or processes</p> <p>Our organisational structure helps us to take decisions rapidly</p> <p>Within our organisation the communication (e.g. about innovation) is effective and works top down, bottom up and across the organisation</p> <p>We actively manage our portfolio of innovation initiatives</p>



	up and across the organisation Our reward and recognition system supports innovation									Our organisation have clearly established roles and responsibilities for organising and conducting innovation activities
Innovation culture			Provide time, space and money to exploit new ideas  Support and active involvement of top management  Build excitement about innovation  Accept failures and mistakes  Involve internal and external resources							Our organisation provides time, space and money to exploit new ideas  Our organisation allocates consequently and visibly resources for the innovation area  The employees are continuously looking for better principles and methods within innovation via conferences, knowledge centres, networks and partners  Our organisation builds excitement about innovation  Our organisation accepts failures and mistakes  Our organisation involves internal and external partners in their processes
Innovation leadership	Our top team have a shared vision of how the company organisation will develop through innovation	Senior management accountability: new product performance results were measured, new product performance was a part of seniors management performance objectives and senior management's compensation or bonuses were tied to new product results.		involvement innovation goals,  Involvement for generating and implementing innovation  Encouraging climate for innovation						Our management has a shared vision how the organisation develops through innovation  Our management (e.g. operational centre) is closely involved by formulating innovation goals  Our management is accountable for realising innovation: innovation performance is a part of their performance objective and the innovation performance are measured.  Our management is actively involved by generating innovative ideas, experimentation and implementing of innovations  Our management encourages a climate for innovation  Our management actively encourages the submission of new ideas



										Our management is accountable for realising innovation: innovation performance is a part of their management performance objectives and the innovation performance are measured
(innovation) resources					<p>People (e.g. number committed to innovation, mix of types, propensity to innovate, skills, experience and education)</p> <p>Physical and financial resources (e.g. which, slack in resources)</p> <p>Tools (e.g. extent of using formal systems and tools, nature such as the availability and use of tools and techniques for promoting creativity or the availability and use of systems of quality control ranging from informal methods to specific techniques such as total quality management)</p>	<p>Committing the necessary people</p> <p>Allowing them sufficient time</p> <p>Providing adequate R&amp;D budget</p>	<p>Personnel resources:</p> <p>Availability of time and resources</p>	<p>Our company provides training in creativity, innovation and/or other problem-solving techniques</p>		<p>Our organisation allows a sufficient number of people and time for conducting and organising innovation activities (e.g. searching ideas, developing and testing, implementing)</p> <p>Our organisation provides training in creativity, experimentation, implementation and/ or other problem solving techniques</p> <p>Our organisation provides adequate budget for developing and implementing innovations</p> <p>Our organisation is able to find additional funding outside the organisation (e.g. national and European)</p> <p>Our organisation provides different kind of tools, techniques and facilities (infrastructure) to promote creativity, to facilitate experimentation, to support development and implementation of innovation</p> <p>Our organisation provides different kind of tools, techniques and systems to facilitate the coordination, communication and decision making of innovation activities</p>
External network/ ecosystem		<p>We have good 'win-win' relationships with our suppliers</p> <p>We work well with universities and other research centres to help</p>							<p>Gatekeepers are in place to continuously span the external environment</p> <p>Alliances are often formed with other organisations for mutual benefit</p>	<p>Our organisation has gatekeepers in place to continuously span the external environment</p> <p>We work closely together with universities, knowledge institutes and other research centres to help us develop our knowledge</p> <p>We collaborate with other organisations to develop innovations, for instance the form of alliances, living labs and innovation hubs</p>



		<p>us develop our knowledge</p> <p>We collaborate with other firms to develop new products or processes</p> <p>We try to develop external networks of people who can help us - for example, with specialist knowledge</p> <p>We work closely with the local and national education system to communicate our needs for skills</p>								<p>We work closely with other operational centres in the field of innovation</p> <p>We work closely with the local and national education system to communicate our needs for skills</p> <p>We participate in (inter) national research programs (e.g. H2020)</p>
Supportive capabilities									<p>There is synergy among product innovation projects</p> <p>Product strategy is used to align priorities with other functions</p> <p>There is a good balance of projects which maximises the value of the portfolio</p>	<p>Our organisation has sufficient and competent people available for managing its innovation portfolio-management</p> <p>Our organisation has clearly defined processes, procedures and methods to organise and manage the innovation portfolio (e.g. creating synergy between project, balancing project to maximise value; balancing risks, aligning with innovation goals)</p> <p>Our organisation is competent enough and has sufficient capacity for managing innovation projects and or programs (e.g. pilots or living labs to experiment with</p>



									<p>The product portfolio is matched to the firm's competencies and capabilities</p>	<p>new technology and implementation programs)</p> <p>Our organisation is competent enough and have sufficient capacity to formulate its needs to external partners (e.g. suppliers, knowledge institutes)</p> <p>Our organisation has clearly defined processes, procedures and systems and enough knowledge enabling implementation of innovation structurally into the operation</p> <p>Our organisation has clearly defined processes, procedures and systems enabling interaction, collaboration and contracting with external partners</p> <p>Our organisation has clearly defined processes, procedures and systems enabling the search for knowledge or knowledge workers, share knowledge and to develop knowledge (e.g. about technology)</p>
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