AARHUS SCHOOL OF ENGINEERING

Detailed Design Description

SitaWare Civilian
Company: B

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Revision history

Version	Date	Changes
1.0	12-02-2015	Document created.

Table 1. Revision history.

Glossary and Terms

The following table contains a glossary of abbreviations and technical subject-specific terms used in this document which require further explanation.

Abbreviation	Meaning	Explanation
COP	Common Operational Picture	Display/picture of relevant information in operation area.
HQ	Head Quarter	Location where the most important functions of an organization are coordinated.
GPS	Global Positioning System	
GSM	Global System for Mobile Communication	
bdd	Block definition diagram	
ibd	Internal block diagram	

Table 2. Glossary.

Table of Contents

Introduction 1

This document contains a detailed design description.It seeks to identify the components of the system along with the interfaces between them.Furthermore the behaviour of the system is elaborated in greater detail.

System-wide Design Decisions 2

In this chapter, the decision for the system-wide detailed design is made.

2.1 Input and Output

The system shall get inputs from the various users, from sensors on the Dismounted COP and from external databases. The inputs from the user is registered either in the HQ or on the Dismounted COP. The external databases gives input to the Server, which distributes the data to the HQ and the Dismounted COP. The system gives outputs from the Server, the HQ and the Dismounted COP.

A description of the various users, is given in the System Requirements Specification section 2.1.

2.2 Behavior Resulting from I/O

The Server shall receive and distribute data in the system according to the modes the users are using. The Server also distributes system updates. The Dismounted COP shall give warnings if the sensors register a dangerous value. Both the HQ and the Dismounted COP shall show the information selected by the user, according to the selected mode. When an audio command is given from the the HQ, the Dismounted COP must play the audio command to the user. The HQ controls the connection to the Dismounted COP, meaning that the HQ chooses which Dismounted COP it will be connected to.

2.3 User interaction with system

The system consists of two overall devices: An HQ COP and a dismounted COP. The user interface to the two devices are somewhat similar, and is described the following paragraphs.

COP

- **Touchscreen:**
  The primary interface of the COP is the touchscreen of the device. The touchscreen lets the user navigate in the application through touch inputs.
- **Microphone:**
  The microphone is part of the audio user interface. It allows the user to navigate in the application through voice commands. Furthermore, it is part of a telecommunication interface between the SitaWare Civilian users.
- **Speaker:**
  The speaker is part of the audio user interface. It provides the user with warning sounds in case of dangerous radiation, temperatur or oxygen levels. Furthermore, it is part of a telecommunication interface between the SitaWare Civilian users.
- **Keyboard:**
  The keyboard is a secondary user interface to the COP that accompanies the touchscreen in letting the user navigate in the application. The keyboard is used by the user to navigate in the application through touch inputs.
- **Mouse:**
  The mouse is a secondary interface to the COP that accompanies the touchscreen in letting the user navigate in the application. The mouse is used by the user to navigate in the application through touch and movement inputs.

Dismounted COP

- **Touchscreen:**
  The primary interface of the dismounted COP is the touchscreen of the device. The touchscreen lets the user navigate in the application through touch inputs.
- **Microphone:**
  The microphone is part of the audio user interface. It allows the user to navigate in the application through voice commands. Furthermore, it is part of a telecommunication interface between the SitaWare Civilian users.
- **Speaker:**
  The speaker is part of the audio user interface. It provides the user with warning sounds in case of dangerous radiation, temperatur or oxygen levels. Furthermore, it is part of a telecommunication interface between the SitaWare Civilian users.

2.4   Safety, Security, and Privacy

The system has 3 modes to ensure the correct user rights. The default mode is for normal actors in the field. The Commander mode is for the commanding users. The Administrator mode is for service personal, for maintaining purposes. All data must be encrypted.

2.5   Physical Aspects

Figure 2.1. Physical appearence of the Dismounted device.

System Architectural Design 3

3.1 System Components

This chapter seeks to identify the system components. It provides a block definition diagram (bdd) of the system, where the system components are determined along with the static relationship between them. A unique name has been assigned each block (with prefix SDD (System Design Description)), so that each system component can be mapped to the requirement from which it originates in the Requirements Traceability Matrix in section 4. The block definition diagram is shown in figure 3.1:
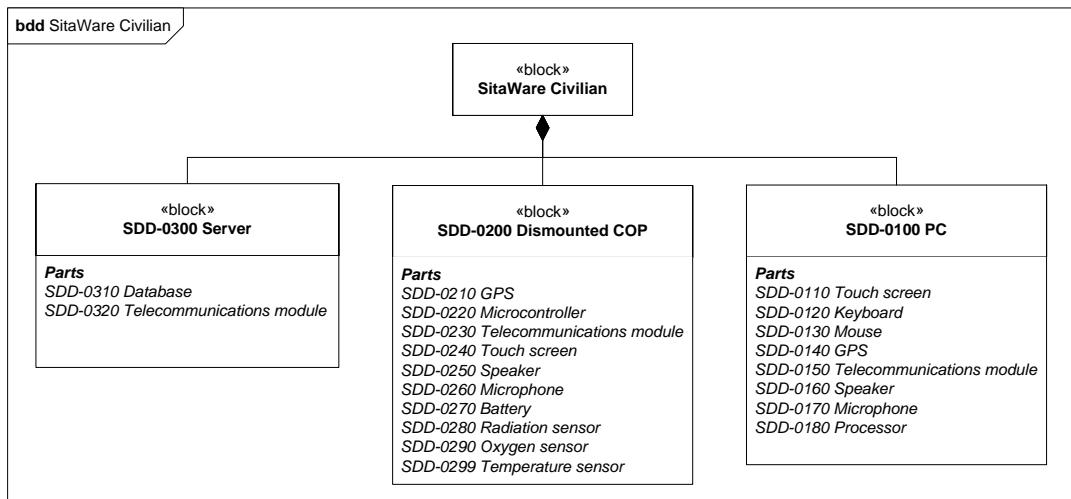

Figure 3.1. Block diagram of the system.

The diagram consists of system-blocks along with parts associated to each block. The system-blocks are depicted as two-compartment blocks with the name of the block in the first compartment, and sub parts in the second compartment. In the next section, a short description of each system-block is given.

3.1.1 Component description

- **PC:** This block constitutes the machine in the head quarter (HQ) on which the COP-software will be executed. It is not within the scope of this project to develop

the PC itself. However, there are parts required for the PC to enable it to interact with the rest of the system. These parts are specified in the block diagram. The PC has a GPS module, so that the location of the HQ is always known. The PC also has a telecommunication module, in order to be able to communicate with the rest of the system. Furthermore the PC has a touchscreen that lets the user navigate in the application through touch inputs. An audio interface is constituted of a microphone and a speaker.

- **Server:** The server will facilitate communication between the other blocks. It has a telecommunication module, in order to be able to communicate with the rest of the system. In addition, it will store user information along with logs locally in an internal database.

- **Dismounted COP:** This block constitutes the machine on which the condensed COP-software will be executed. The dismounted COP will be used by the dismounted users in the field. It has a GPS module, so that the location of the dismounted users is always known. Furthermore it has a telecommunication module so that it will be able to communicate with the rest of the system. Furthermore the dismounted COP has a touchscreen that lets the user navigate in the application through touch inputs. An audio interface is constituted of a microphone and a speaker. Lastly the dismounted COP has a radioation sensor, an oxygen sensor and a temperature sensor to enable detection of radiation-, oxygen-, and temperature-levels.

3.2   Concept of execution

Figure 3.2 shows the concept of execution among the system components. It shows the dynamic relationship of the components, that is, how they will interact during system operation. The diagram is based on the overall functionality of the system.
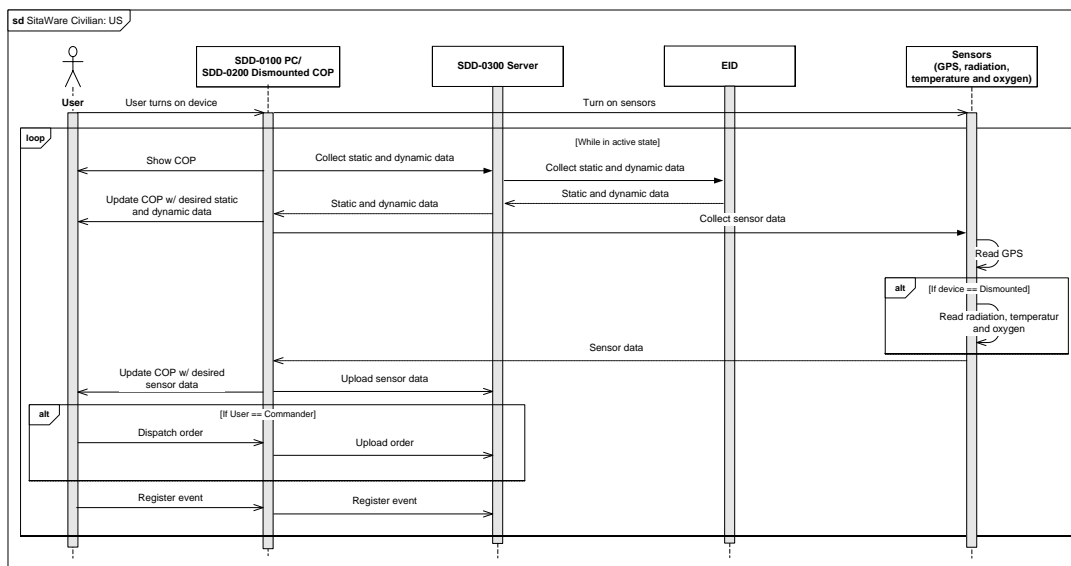

Figure 3.2. Overall sequence diagram for SitaWare Civilian.

Figure 3.3 shows how the system executes through it's different states. Furthermore the different modes are shown. Which mode is used is determined by what user rights the user has.
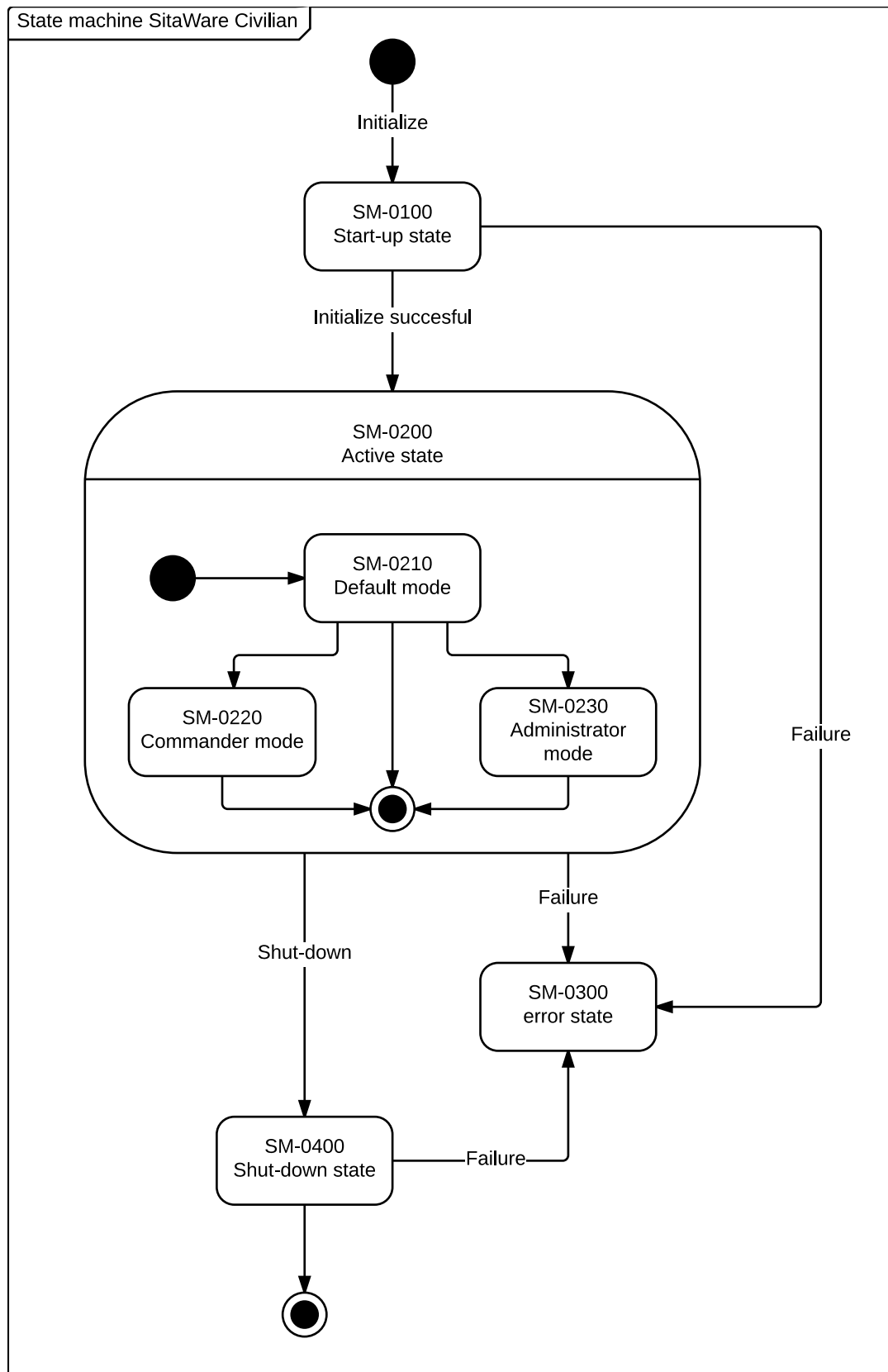
Figure 3.3. State diagram for SitaWare Civilian.

3.3   Interface Design

This section seeks to describe the interface characteristics of the system components. It provides an internal block diagram (bdd) of the system, where the interfaces of the system components are identified, as long as the external interfaces of the system. The internal block diagram of the overall system is shown in figure 3.4:
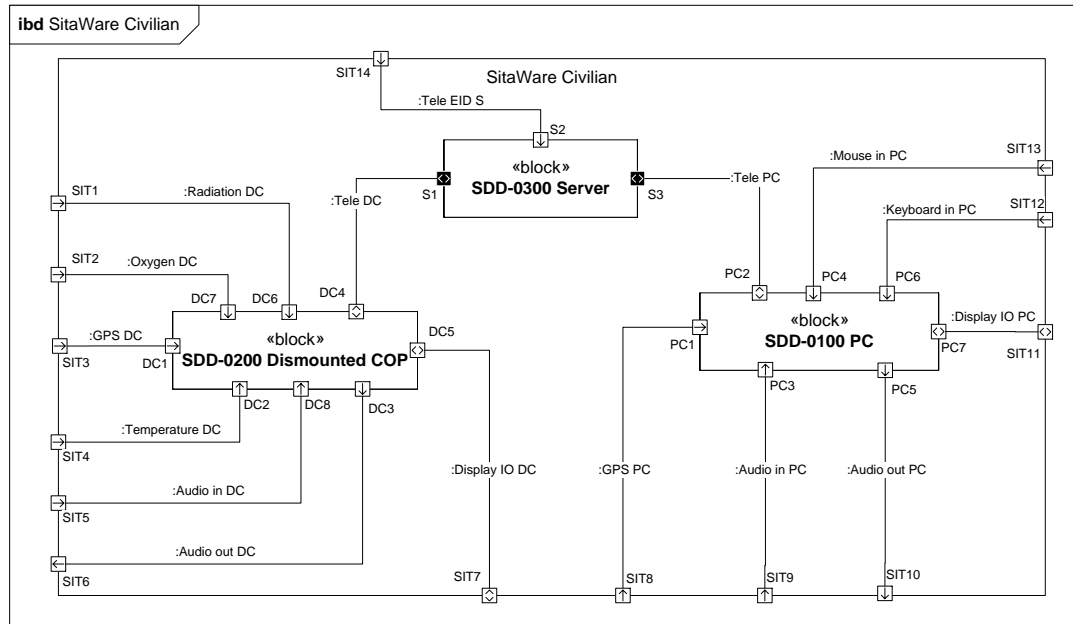

Figure 3.4. Internal block diagram of the system.

Name	Description	Port 1	Port 2
Radiation DC	Radiation level to the dismounted COP	SIT1	DC6
Oxygen DC	Oxygen level signal to the dismounted COP	SIT2	DC7
GPS DC	GPS signal for the dismounted COP	SIT3	DC1
Temperature DC	Temperature signal to the dismounted COP	SIT4	DC2
Audio in DC	Microphone for communication purposes	SIT5	DC8
Audio out DC	Speaker for communication purposes	SIT6	DC3
Display IO DC	Display input/output for dismounted COP	SIT7	DC5
GPS PC	GPS signal for the PC	SIT8	PC1
Audio in PC	Microphone for communication purposes	SIT9	PC3
Audio out PC	Speaker for communication purposes	SIT10	PC5
Display IO PC	Display input/output for PC	SIT11	PC7
Keyboard PC	Keyboard input to the PC	SIT12	PC6
Mouse in PC	Mouse input to the PC	SIT13	PC4
Tele EID S	Telecommunication between the server, and an external information database	SIT14	S2
Tele DC	Telecommunication between the dismounted COP and the server	DC4	S1
Tele	Telecommunication between the PC and the server	PC2	S2

Table 3.1. General ibd

3.3.1   PC

In this section the internal interfaces of the PC to be used in this system are specified in greater detail. All the sub parts of the PC are connected to the processor which manages all logic operations and functions, while the telecommunication module enables the PC to communicate with the remaining system components. It is not within the scope of this project to develop the PC itself, however the COP is to be executed on the PC. Therefore the interfaces of the PC are identified, to ensure that the PC - and thereby the COP - can communicate with the rest of the system. The internal block diagram of the PC is shown in figure 3.5:
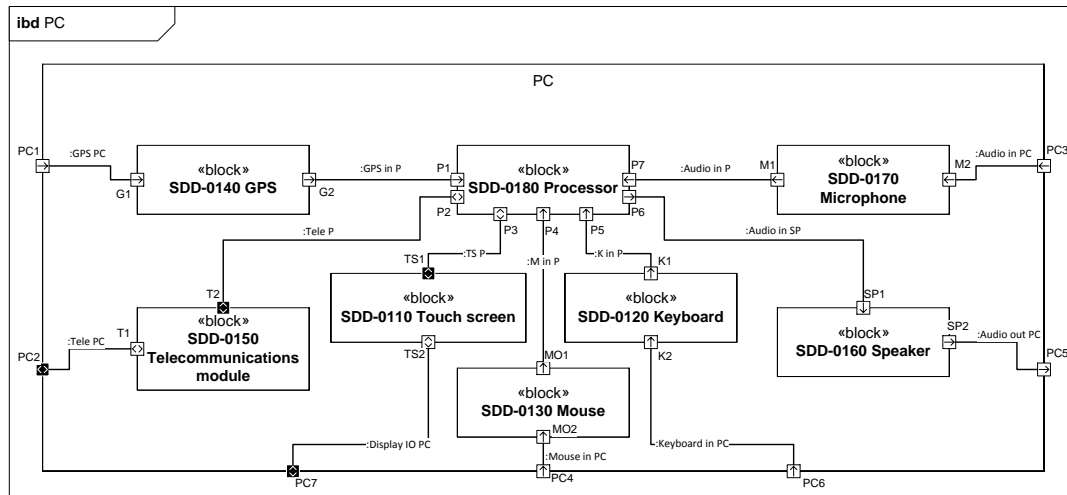
Figure 3.5. Internal block diagram of the PC.

Name	Description	Port 1	Port 2
GPS DC	Dismounted COP receiving GPS signal	G1	PC1
Tele PC	Telecommunication between the PC and the server	T1	PC2
Audio in PC	Microphone for communication purposes	M2	PC3
Mouse in PC	Input from the mouse	MO2	PC4
Audio out PC	Speaker for communication purposes	SP2	PC5
Keyboard in PC	Input from the keyboard	K2	PC6
Display IO PC	Input and output from user to the touch screen	TS2	PC7
GPS in P	Signal from the GPS to the processor	P1	G2
Tele P	Communication between the telecommunications module and the processor	P2	T2
TS P	Communication between the touch screen module and the processor	P3	TS1
M in P	Signal from the mouse to the processor	P4	MO1
K in P	Signal from the keyboard to the processor	P5	K1
Audio in SP	Signal from the processor to the speaker	P6	SP1
Audio in P	Signal from the microphone to the processor	P7	M1

Table 3.2. Dismounted COP ibd

Requirements traceability 4

This chapter traces the requirements to the user needs.

4.1   Traceability matrix

The traceability matrix ensures that all requirements fulfill a need. If a requirement does not fulfill a need, then it is redundant, or a new need has to be created. In the context of the detailed design description, a reference to the unique names of blocks and states has been added to the corresponding requirements in the "Design document reference" column of the traceability matrix.

Project name:	SitaWare Civilian	Business area:	Civilian Crises Management
Project manager:	René Arendt Sørensen	Business Analyst lead:	Rasmus Fredensborg Jensen
QA lead	Peter Kristian Mathiesen	Target implementation date:	

Req. id.	Catagory of functional activity	Requirement description	Use case reference	Design document reference	Code or module reference	Test case reference	User acceptance validation	Comments
FR-0030	-	States		SM-0100				
FR-0040	-	States		SM-0200				
FR-0050	-	States		SM-0300				
FR-0060	-	States		SM-0400				
FR-0070	-	Modes		SM-0210				
FR-0080	-	Modes		SM-0220				
FR-0090	-	Modes		SM-0230				
FR-0110	N-030	Capability		SDD-0210, SDD-0140				
FR-0115	N-020	Capability		SDD-0110, SDD-0150, SDD-0240, SDD-0230,				
FR-0120	N-020	Capability		SDD-0300, SDD-0320				
FR-0130	N-020	Capability		SDD-0300, SDD-0320				
FR-0140	N-020	Capability		SDD-0300, SDD-0320				
FR-0150	N-020	Capability		SDD-0300, SDD-0320				
FR-0160	N-020	Capability		SDD-0300, SDD-0320				
FR-0170	N-010	Capability		SDD-0150, SDD-0230, SDD-0310, SDD-0320				

Table 4.1. Requirement traceability matrix.

Project name:	SitaWare Civilian		Business area:	Civilian Crises Management				
Project manager:	René Arendt Sørensen		Business Analyst lead:	Rasmus Fredensborg Jensen				
QA lead	Peter Kristian Mathiesen		Target implementation date:					
Req. id.	Catagory of functional activity	Requirement description	Use case reference	Design document reference	Code or module reference	Test case reference	User acceptance validation	Comments
FR-0180	N-020	Capability		SDD-0150, SDD-0230, SDD-0310, SDD-0320				
FR-0190	N-020	Capability		SDD-0110, SDD-0240				
FR-0200	N-020	Capability		SDD-0110, SDD-0150, SDD-0230, SDD-0240, SDD-0310, SDD-0320				
FR-0210	N-020	Capability		SDD-0110, SDD-0150, SDD-0230, SDD-0240, SDD-0310, SDD-0320				
FR-0220	N-010	Capability		SDD-0330				
FR-0230	N-020	Capability		SDD-0140, SDD-0150, SDD-0210, SDD-0230, SDD-0310, SDD-0320				
FR-0240	N-020	Capability		SDD-0150, SDD-0230, SDD-0310, SDD-0320				
FR-0250	N-020	Capability		SDD-0150, SDD-0230, SDD-0310, SDD-0320				

Table 4.2. Requirement traceability matrix.

Project name:	SitaWare Civilian	Business area:	Civilian Crises Management
Project manager:	René Arendt Sørensen	**Business Analyst lead:**	Rasmus Fredensborg Jensen
QA lead	Peter Kristian Mathiesen	**Target implementation date:**	

Req. id.	Catagory of functional activity	Requirement description	Use case reference	Design document reference	Code or module reference	Test case reference	User acceptance validation	Comments
FR-0260	N-020	Capability		SDD-0150, SDD-0230, SDD-0310, SDD-0320				
FR-0270	N-010	External interface		SDD-110, SDD-0240				
FR-0280	N-010	External interface		SDD-110, SDD-0240				
FR-0290	N-010	External interface		SDD-0160, SDD-0170, SDD-0250, SD-0260				
FR-0300	N-020	External interface		SDD-0150, SDD-0230, SDD-0300, SDD-0310,				
FR-0320	N-010	Internal interface		SDD-0150, SDD-0230, SDD-0320				
FR-0330	-	Data interface		SDD-0310				
FR-0340	-	Data interface		SDD-0310				
FR-0350	N-020	Safety		SDD-0280				
FR-0352	N-020	Safety		SDD-0299				

Table 4.3. Requirement traceability matrix.

Project name:	SitaWare Civilian		Business area:	Civilian Crises Management				
Project manager:	René Arendt Sørensen		Business Analyst lead:	Rasmus Fredensborg Jensen				
QA lead	Peter Kristian Mathiesen		Target implementation date:					
Req. id.	Catagory of functional activity	Requirement description	Use case reference	Design document reference	Code or module reference	Test case reference	User acceptance validation	Comments
FR-0354	N-020	Safety		SDD-0290				
FR-0360	-	Security		SDD-0110, SDD-0240				
FR-0370	-	Security		-				
FR-0380	-	Security		-				
FR-0390	-	Environment		-				
FR-0400	-	Environment		-				
FR-0410	-	Environment		-				
FR-0420	-	Environment		-				
FR-0430	N-040	Quality		-				
FR-0440	-	Quality		-				
FR-0450	-	Quality		-				
FR-0460	-	Design constraints		-				
FR-0470	-	Design constraints		-				
FR-0480	-	Personnel-related		-				

Table 4.4. Requirement traceability matrix.

Referenced Documents 5

This chapter contains a brief description of the documents referenced to in this document.

Version	Document name	Description
1.3	System Requirement Specification	The System Requirement Specification(SRS) contains all of the requirements that the system has to fulfil.

Table 5.1. Referenced Documents.