



D6.8

Situation Assessment, Impact Summary Generation and sCOP/SITREP Specification and Implementation Report – Final

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Table of Contents

List of Figures.....	v
List of Tables.....	vi
List of Acronyms.....	viii
Executive Summary	11
1 Introduction	12
2 Technical Requirements.....	14
2.1 Interface Requirements	14
2.1.1 Hardware Interfaces	14
2.1.2 Software Interfaces	14
2.1.3 Communication Interfaces.....	14
2.2 Functional Technical Requirements	14
2.2.1 Short-Term Features.....	14
2.2.2 Mid-Term Features.....	15
2.2.3 Long-Term Features.....	22
3 Reference Architecture.....	24
3.1 HEIMDALL Overall Architecture	24
3.2 Inputs and Outputs	24
3.3 Interfaces with other HEIMDALL components	26
4 Module Functionality	27
4.1 Situation Assessment in Response Planning.....	27
4.1.1 Situation Awareness Information	27
4.1.2 Service-based Approach to SA and DS.....	30
4.1.3 sCOP and Standardised Information Exchange	30
4.2 Functionalities	31
4.2.1 Impact Summary for Geographical Objects of Interest (GOIs)	31
4.2.2 Impact Summary and Situation Reports as Tools for the Analysis of Future Scenarios	32
4.3 Iterative and Incremental Design.....	32
4.4 Architecture.....	32
4.5 Data Model.....	33
4.6 REST API Conventions	34
4.7 Workflows	34
4.7.1 Situation Assessment Workflow	34
4.7.2 Situation Report Generation Workflow	34
5 Technical Specification.....	37

5.1	Multi-Criteria Impact Summary Metrics.....	37
5.2	Impact Summary Service (ISAS)	37
5.2.1	Information Flow.....	37
5.2.2	Information Fusion	38
5.2.3	Jobs	39
5.2.4	Configuration.....	41
5.2.5	Results and GOIs at Risk	46
5.2.6	Visualization of ISA information in the GUI	52
5.2.7	Summary of Functionality	54
5.3	Situation Report Generation Service (SITREP)	55
5.3.1	Workflow	66
5.3.2	REST API.....	67
6	Implementation Details	69
6.1	Impact Summary Service (ISAS)	69
6.1.1	Software Implementation.....	69
6.1.2	Data Infrastructure	69
6.1.3	Hardware	69
6.2	Situation Report Generation Service (SITREP)	70
6.2.1	Software Implementation.....	70
6.2.2	Hardware	70
7	Test Plan	71
7.1	Test Report ISAS	71
7.2	Test Report SITREP.....	77
7.3	Test Summary	77
8	Conclusion	79
9	References.....	80
	Annex A: SITREP example request body	83
	Annex B: SITREP example response body	104

List of Figures

Figure 3-1: HEIMDALL overall architecture	24
Figure 4-1: The Situation Awareness Concept by Endsley [5]	27
Figure 4-2: The core SA and DS workflow in PHAROS [9]	28
Figure 4-3: SAW information relevant for strategic response planning.....	29
Figure 4-4: ISAS modules	32
Figure 4-5: Scenario management modules with the SITREP module being highlighted	33
Figure 4-6: ISAS data model with the job resource as major entry point, with input sub-resources (green), configuration (orange) and product sub-resources (blue).....	33
Figure 4-7: HEIMDALL SA workflow.....	34
Figure 4-8: HEIMDALL situation report generation workflow.....	35
Figure 4-9: HEIMDALL situation reports at different points in the lifetime of an ongoing scenario	36
Figure 5-1: General ISAS workflow.....	38
Figure 5-2: Information integrated for the generation of ISA information.....	39
Figure 5-3: Screenshot of the visualization of ISA results in the GUI as it looked in Release C	52
Figure 5-4: Impact summary popup in the GUI (final release).....	53
Figure 5-5: Screenshot of the visualization of ISA results in the GUI (final release); The “Impact Summary” block is displayed below the RVA impact assessment (“Impacted Buildings” and “Buildings Assessment Screenshot”) which has been used as input; A subset of total numbers is displayed above the “Show more” button which opens the impact summary popup. The next two buttons allow the user to download the list of affected GOIs in CSV format (first button downloads all affected buildings, second button downloads only the affected vulnerable elements).....	53
Figure 5-6: Downloaded affected buildings imported into Microsoft Excel.....	54
Figure 5-7: EDXL-HEIMDALL concepts identified in an early stage of the project	56
Figure 5-8: Request for the provision of a scenario snapshot in EDXL-HEIMDALL format ...	66

List of Tables

Table 2-1: Technical Requirement TR_SA_1	14
Table 2-2: Technical Requirement TR_SA_5	15
Table 2-3: Technical Requirement TR_SA_2	15
Table 2-4: Technical Requirement TR_SA_3	16
Table 2-5: Technical Requirement TR_SA_4	16
Table 2-6: Technical Requirement TR_SA_6	17
Table 2-7: Technical Requirement TR_SA_7	17
Table 2-8: Technical Requirement TR_SA_8	17
Table 2-9: Technical Requirement TR_SA_10	18
Table 2-10: Technical Requirement TR_SA_12.....	18
Table 2-11: Technical Requirement TR_SA_16.....	19
Table 2-12: Technical Requirement TR_SA_17.....	19
Table 2-13: Technical Requirement TR_SA_18.....	20
Table 2-14: Technical Requirement TR_SA_19.....	20
Table 2-15: Technical Requirement TR_SA_20.....	21
Table 2-16: Technical Requirement TR_SA_21.....	21
Table 2-17: Technical Requirement TR_SA_22.....	22
Table 2-18: Technical Requirement TR_SA_23.....	22
Table 2-19: Technical Requirement TR_SA_13.....	22
Table 3-1: ISAS inputs and outputs	24
Table 3-2: SITREP inputs and outputs	26
Table 3-3: Interfaces with other components	26
Table 5-1: ISAS job parameters	39
Table 5-2: ISA information attributes for GOIs at risk.....	48
Table 5-3: Functionality related to jobs	54
Table 5-4: Functionality related to results	55
Table 5-5: EDXL-DE EDXLDistribution element filled with scenario parameters.....	56
Table 5-6: EDXL-SitRep root element filled with scenario parameters.....	57
Table 5-7: EDXL-SitRep Report element type="SituationInformation" mapping	58
Table 5-8: EDXL-SitRep Report element type="CasualtyAndIllnessSummary" mapping	59
Table 5-9: EDXL-SitRep Report element type="ManagementReportingSummary" mapping	59
Table 5-10: EDXL-DE ContentObject <OtherContent> mapping	62
Figure 5-8: Request for the provision of a scenario snapshot in EDXL-HEIMDALL format	
Table 5-11: SITREP functionality.....	66
Table 7-1: Test template.....	71

Table 7-2: TS_SA_1	71
Table 7-3: TS_SA_2	72
Table 7-4: TS_SA_3	73
Table 7-5: TS_SA_4	74
Table 7-6: TS_SA_5	75
Table 7-7: TS_SA_6	75
Table 7-8: TS_SA_7	76
Table 7-9: TS_SA_8	77
Table 7-10: Test coverage matrix	77

List of Acronyms

A-COP	Alerting COP
AB	Advisory Board
AOI	Area of Interest
API	Application Programming Interface
C&C	Command & Control Centre
CI	Critical Infrastructure
COP	Common Operational Picture
CSV	Comma-separated Values
CSW	Catalog Service for the Web
DB	Database
DES	Decision Support Service
DS	Decision Support
DSS	Decision Support System
DLR	Deutsches Zentrum für Luft- und Raumfahrt e.V.
DLR-DFD	Deutsches Zentrum für Luft- und Raumfahrt e.V.; German Remote Sensing Data Center
DLR-KN	Deutsches Zentrum für Luft- und Raumfahrt e.V.; Institute of Communications and Navigation
ECI	European Critical Infrastructure
EDXL	Emergency Data Exchange Language
ELSI	Ethical, Legal and Social Issues
EMSI	Emergency Management Shared Information
ETA	Estimated Time of Arrival
EUW	End User Workshop
FCP	Forward Command Post
GOI	Geographical Object of Interest
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IETF	Internet Engineering Task Force
IPsec	Internet Protocol Security

ISA	Impact Summary
ISAS	Impact Summary Service
JSON	JavaScript Object Notation
OGC	Open Geospatial Consortium
PE	Plan Execution
PF	Plan Formulation
REST	Representational State Transfer
SA	Situation Assessment
SAW	Situation Awareness
sCOP	shared Common Operational Picture
SITREP	Situation Report Generation Service
SM	Scenario Management
SP	Service Platform
SQL	Structured Query Language
SI	Strategic Infrastructure
TOC	Table of Contents
TR	Technical Requirement
TSYL	Tecnosylva S.L.
UI	User Interface
VM	Virtual Machine
VPN	Virtual Private Network
W3C	World Wide Web Consortium
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Mapping Service
WP	Work Package

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Executive Summary

This document presents the HEIMDALL situation assessment (SA) concept and technical component design. The concept has been elaborated in close collaboration with the end-users in order to ensure an appropriate and desired degree of SA by technology. The main objective of this document is to provide a technical specification which enables technical contributors and partners to understand how to develop, deploy, configure and use the SA components. Therefore, topics include the external and internal architecture design, interfaces, data structures, formats, functionality, methods, configuration and software issues. In addition, the document contains implementation details and the test plan and results.

The main task contributing to this deliverable is T6.3 – Situation Assessment Services. However, significant contributions were made by tasks 3.1 – Stakeholder Management and 2.4 – Service Concept Specification and System Architecture due to the fact that tool-assisted SA is an important element in the response planning process of the end-user organizations and in the overall HEIMDALL system.

Two major HEIMDALL components which aim to support the SA of all stakeholders involved in the risk situation are specified in this deliverable: The Impact Summary Service (ISAS) and the Situation Report Generation Service (SITREP).

The final version of ISAS enables users to generate aggregated Impact Summary (ISA) information for a specific scenario. ISA information supports end users in C&Cs (Command & Control Centres) and FCPs (Forward Command Posts) to identify risks to people, property and environment and to decide on the working strategy for the response planning to come. ISA information is intentionally generated in a descriptive format which can be used by other HEIMDALL and external system components to transform it into the most usable representation in the decision making situation. An exemplary use case would be the aggregation of risk or damage values of the buildings of a certain administrative area, e.g. a city quarter.

The SITREP transforms situational and scenario information stored in the HEIMDALL system into a standardized message format based on EDXL (Emergency Data Exchange Language). SITREP aims to improve the coordination and exchange of information with existing systems used by end-user organizations throughout the response planning process.

1 Introduction

For emergency managers, the assessment of the evolution and consequences of real or hypothetical disaster situations, including potential cascading effects and interacting hazards, is the basis for decisions on the path to follow to achieve the desired outcome. This document describes efforts performed and results produced so far in the HEIMDALL project in finding and designing technical solutions which support the end users' SA activities, suitable to all involved perspectives. The document focuses on the Impact Summary Service (ISAS) and the different types of generated information products, the so-called ISA (Impact Summary) information. In addition, the Situation Report Generation Service (SITREP), which provides situation and scenario information in a standardized emergency messaging format, is specified.

The focus of this document lies in the final component design with a full specification of technical details. The HEIMDALL project aims at a collaborative design which is a methodology that involves people who will be affected by new technologies throughout all design phases [1]. Unlike traditional approaches to develop information systems of having a fixed product and/or system idea that does not change or evolve as the development process take place, an agile approach is a response to the need for a flexible and iterative process to be able to consider unexpected changes [2].

In close cooperation with the relevant stakeholders, both the consortium end-user partners and the members of the AB, the component design has evolved. Since the first documentation of ISAS and SITREP in D6.7 (M18) [31], end users have been able to trial and evaluate the maturing HEIMDALL system during the EUWs. Hereby, EUWs served on the one hand to determine the validity of the implemented products and services when used in a real-world situation by decision makers, who are the potential user of the system. On the other hand, EUWs made possible to the end user partners to discuss on common and specific procedures and constraints and to identify needs and gaps based on a visual and functional system prototype. Based on these insights' user requirements have been updated, most recently in D2.9 [3]. The technical requirements, concepts and specifications in this document reflect these updates.

In particular, D6.8 updates concern:

- Technical requirements in section 2 have been refined and newly added based on updated system requirements in D2.9.
- ISAS products resp. outputs have been re-designed to provide the best-suitable granularity for situation and impact assessment; The new data model is described in sections 3.2, 4.5 and 5; The product "Hazard evolution information" has been moved to scenario management and redesigned as scenario snapshots which capture the scenario evolution including hazard-related changes over time (see D6.15 [22])
- The ISAS and SITREP specification in section 5, in particular the REST APIs and implementation details have been updated
- The test plan and results in section 7 have been updated

The document is organised as follows:

- Section 2 specifies the technical requirements for the ISAS and SITREP modules.
- Section 3 describes the ISAS and SITREP in the context of the overall HEIMDALL system, inputs and outputs and interfaces with other HEIMDALL components.
- Section 4 starts with background on situation assessment in response planning and continues with ISAS and SITREP concepts, functionalities, building blocks and workflows.

- Section 5 presents the detailed ISAS and SITREP specifications including specifications of data products, REST API and configuration.
- Section 6 describes software and database implementation details.
- Section 7 introduces the test plan and provides the test report for functionalities implemented for the final release.
- Finally, section 8 summarizes the work carried out so far and gives an outlook to future work.

2 Technical Requirements

This section includes the list of technical requirements for the ISAS and SITREP modules.

2.1 Interface Requirements

2.1.1 Hardware Interfaces

The ISAS and SITREP components shall be accessible via Ethernet. If a Virtual Private Network (VPN) is used it must offer IPSec compatibility.

2.1.2 Software Interfaces

The ISAS shall be deployed as Linux-based container and/or virtual machine (VM). The SITREP shall be either deployed as a standalone Linux-based container and/or VM or as a compatible module for integration into the SM component.

2.1.3 Communication Interfaces

The ISAS and SITREP shall be connected to the other HEIMDALL components through the Service Platform (SP).

The ISAS and SITREP shall be designed as RESTful web services allowing clients to communicate with them using common HTTP methods (e.g. GET, PUT) and/or for georeferenced data Open Geospatial Consortium (OGC) methods (based on HTTP).

Focused on providing a lightweight and easily consumable output format, the ISAS data shall be exchanged using JSON serialization and the formats specified by the respective OGC standards. The SITREP shall provide data in a situation reporting standard message format (e.g. EDXL-SitRep).

2.2 Functional Technical Requirements

2.2.1 Short-Term Features

Table 2-1: Technical Requirement TR_SA_1

Requirement ID:	TR_SA_1
Related SR(s):	<ul style="list-style-type: none">• Sys_SADS_1
Description:	
The ISAS shall generate and provide for an AOI or the area of scenario an impact summary in the form of <ul style="list-style-type: none">• A <u>list of potentially affected geographic elements (GOIs)</u> available in the system (provided through the exposure layers, i.e. buildings and roads) together with impact summary (ISA) information for each of these elements. The list of affected GOIs enriched with ISA information is compiled by intersecting the exposure layers with the outputs of the impact assessment component and a pre-selected AOI. No further data enrichment shall be performed.	
Rational: The user shall be supported in their situation awareness by ISA information generated by the system. This enables the user, upon modifying inputs and conditions, to better anticipate the different resulting impacts to buildings, roads and other infrastructure and to share ISA information, e.g. for planning.	
Stimulus: After running a simulation and simulation-based impact assessment the GUI/SP requests the generation of ISA information for a selected AOI, the active scenario, and	

impact assessment results.
Response: The ISAS returns a list of affected GOIs together with ISA information for each of the objects, e.g. for display in the map or for inclusion in a situation report.
Verification Criterion: ISA information describing impact to GOIs can be requested
Notes: none

Table 2-2: Technical Requirement TR_SA_5

Requirement ID:	TR_SA_5
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_16
Description:	
The SITREP shall allow access to the scenario information and associated information such as ISA information in <u>descriptive form (XML)</u> . Existing standards shall be used where possible.	
Rational: The user's situation awareness shall be supported by providing access to scenario information in the most appropriate format. By adopting existing standards where possible data interoperability is increased. A descriptive format allows to assemble a situation report including ISA information. Such a report can be used in case of real situations for exchanging it with other users and resources in the field, for staff meetings, for archiving, etc. In case of simulated scenarios, such reports can help to compare different scenarios and their consequences, to base planning on reports of simulated situations, etc.	
Stimulus: The SP requests scenario information for a specific scenario in descriptive form as well as georeferenced data.	
Response: Scenario information in descriptive form.	
Verification Criterion: Scenario information can be requested for a specific scenario in descriptive form	
Notes: none	

2.2.2 Mid-Term Features

Table 2-3: Technical Requirement TR_SA_2

Requirement ID:	TR_SA_2
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_1 • Sys_SADS_18
Description:	
The ISAS shall generate and provide ISA information for an AOI or the area of scenario in the form of <ul style="list-style-type: none"> • The <u>total number of people at risk</u> in an AOI ISA information is compiled by intersecting the exposure layers with the outputs of the impact assessment component and a pre-selected AOI. No further data enrichment shall be performed.	

Rational: The user shall be supported in their situation awareness by ISA information generated by the system. This enables the user, upon modifying inputs and conditions, to better anticipate the different resulting impacts to the population and to share ISA information, e.g. for planning.
Stimulus: After running a simulation and simulation-based impact assessment the SP requests the generation of ISA information for a selected AOI, the active scenario, and impact assessment results.
Response: The ISAS returns the total number of potentially affected people in the AOI for the active scenario, e.g. for display in the UI or for inclusion in a situation report.
Verification Criterion: ISA information describing the total number of affected people in an AOI can be requested
Notes: none

Table 2-4: Technical Requirement TR_SA_3

Requirement ID:	TR_SA_3
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_13
Description:	
The ISAS shall provide means for <u>configuring thresholds</u> for the automatic generation of ISA information <u>for GOIs at risk</u> . Configuration shall be done before the system is started (configuration file).	
Rational: The user shall be able configure rules and thresholds for ISAS processes according to their individual and organizational needs.	
Stimulus: Rules and thresholds shall be set and modified through configuration in a text file.	
Response: -	
Verification Criterion: Rules and thresholds shall be able to be set and modified through configuration before the system is started. Configuration changes shall be visible in ISAS process results.	
Notes: none	

Table 2-5: Technical Requirement TR_SA_4

Requirement ID:	TR_SA_4
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_13
Description:	
The ISAS shall provide means for <u>configuring thresholds</u> for the automatic generation of ISA information describing <u>people at risk</u> . Configuration shall be done before the system is started (configuration file).	
Rational: The user shall be able configure rules and thresholds for ISAS processes according to their individual and organizational needs.	
Stimulus: Rules and thresholds shall be set and modified through configuration in a text file.	

Response: -
Verification Criterion: Rules and thresholds shall be able to be set and modified through configuration before the system is started. Configuration changes shall be visible in ISAS process results.
Notes: none

Table 2-6: Technical Requirement TR_SA_6

Requirement ID:	TR_SA_6
Related SR(s):	• Sys_SADS_2
Description:	
The ISAS shall generate and provide ISA information <u>for a given list of GOIs</u> .	
Rational: By requesting impact information for custom geographic elements the user can target the impact summary towards specific strategic goals according to his role, knowledge and expertise. For example, he can request ISA information for buildings that first responders are taking care of.	
Stimulus: After running a simulation and simulation-based impact assessment the GUI/SP requests the generation of ISA information for a list of GOIs selected from the exposure layers available in the system (i.e. buildings and roads), a selected AOI, the active scenario, and impact assessment results.	
Response: ISAS returns the list of selected GOIs enriched with ISA information, e.g. for display in the UI or for inclusion in a situation report.	
Verification Criterion: ISA information referring to a scenario and specific geolocation(s) can be requested at any time.	
Notes: none	

Table 2-7: Technical Requirement TR_SA_7

Requirement ID:	TR_SA_7
Related SR(s):	• Sys_SADS_6
Description:	
The ISAS shall provide means for <u>modifying the ISA information</u> generated for each of the <u>potentially affected GOIs</u> in the returned list.	
Rational: The user shall be able to modify ISA information according to his/her knowledge in order to increase precision, consistency and reliability of the ISA information.	
Stimulus: The user updates existing ISA information for a selected scenario over the UI.	
Response: Status OK if modification successful, otherwise error status message	
Verification Criterion: ISA information referring to a scenario can be modified at any time	
Notes: none	

Table 2-8: Technical Requirement TR_SA_8

Requirement ID:	TR_SA_8
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_27
Description:	
The ISAS shall generate and provide for an AOI or the area of scenario an impact summary in the form of <ul style="list-style-type: none"> • a <u>list of potential cascading effects/hazards</u> 	
Results shall be compiled by intersecting the outputs of the exposure and impact assessment components and pre-selected geographic locations. No further data enrichment shall be performed. The exposure dataset must contain potential sources for cascading effects.	
Rational: The user shall be supported in their situation awareness by SA information generated by the system. This fosters preparedness for potential cascading effects.	
Stimulus: After running a simulation and simulation-based impact assessment the SP requests the generation of ISA information for a selected AOI and impact assessment results.	
Response: The ISAS returns ISA information on potential cascading effects, e.g. for display in the UI or for inclusion in a situation report.	
Verification Criterion: ISA information on potential cascading effects for a specific area can be requested from the system at any point in time during a situation and afterwards.	
Notes: none	

Table 2-9: Technical Requirement TR_SA_10

Requirement ID:	TR_SA_10
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_13
Description:	
The ISAS shall provide means for configuring thresholds for the automatic generation of ISA information on potential cascading effects/hazards. Configuration shall be done before the system is started (configuration file).	
Rational: The user shall be able configure rules and thresholds for ISAS processes according to their individual and organizational needs.	
Stimulus: Rules and thresholds shall be set and modified through configuration in a text file.	
Response: -	
Verification Criterion: Rules and thresholds shall be able to be set and modified through configuration before the system is started. Configuration changes shall be visible in ISAS process results.	
Notes: none	

Table 2-10: Technical Requirement TR_SA_12

Requirement ID:	TR_SA_12
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Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_6
Description:	
The ISAS shall provide means for <u>modifying</u> the ISA information on <u>total number of people at risk</u> .	
Rational: The user shall be able to modify ISA information according to his/her knowledge in order to increase precision, consistency and reliability of the ISA information.	
Stimulus: The user updates existing ISA information for a selected scenario over the UI.	
Response: Status OK if modification successful, otherwise error status message	
Verification Criterion: ISA information referring to a scenario can be modified at any time	
Notes: none	

Table 2-11: Technical Requirement TR_SA_16

Requirement ID:	TR_SA_16
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_1 • Sys_SADS_19
Description:	
The ISAS shall provide as a result the total economic damage in a selected area (AOI) where applicable.	
Rational: The user needs a summary of observed and/or potential impacts on the property in one or more AOIs.	
Stimulus: The client (e.g. SP) requests an impact summary with the total number of economic damage for a specified AOI and the prior generated impact assessment products.	
Response: ISA information on the total number of economic damage for the specific AOI, e.g. for display in the UI or for inclusion in a situation report.	
Verification Criterion: ISA information on the total number of economic damage for the specific AOI is returned.	
Notes: Summary of economic damage will be provided only for the assets that can be assessed through RVA damage functions. Necessary statistical information on economic values within administrative boundaries has to be available.	

Table 2-12: Technical Requirement TR_SA_17

Requirement ID:	TR_SA_17
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_1 • Sys_SADS_20
Description:	
The ISAS shall provide as a result the <u>total percentage of potentially damaged GOIs</u> in a selected area (AOI).	
Rational: The user needs an overview of the degree of total damage in one or more AOIs.	
Stimulus: After running a simulation and simulation-based impact assessment the GUI/SP	

requests the generation of ISA information for a selected AOI, the active scenario, and impact assessment results.
Response: ISA information on the total percentage of potentially damaged GOIs in the specific AOI, e.g. for display in the UI or for inclusion in a situation report.
Verification Criterion: ISA information on the total percentage of damaged GOIs/assets for the specific AOI is returned.
Notes: None

Table 2-13: Technical Requirement TR_SA_18

Requirement ID:	TR_SA_18
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_1 • Sys_SADS_20
Description:	
The ISAS shall provide as a result the <u>degree of physical damage for each GOI</u> in the returned list of potentially affected GOIs in a selected area (AOI) if available for the hazard type and impact assessment type.	
Rational: The user needs to know the degree of damage at building/road level in order to assess the most appropriate response.	
Stimulus: After running a simulation and simulation-based impact assessment the GUI/SP requests the generation of ISA information for a selected AOI, the active scenario, and impact assessment results.	
Response: ISA information on the degree of physical damage for each GOI in the returned list of GOIs for the specific AOI, e.g. for display in the UI or for inclusion in a situation report.	
Verification Criterion: ISA information on the degree of physical damage for each GOI in the returned list of GOIs for the specific AOI is returned.	
Notes: Degree of physical damage will be provided only by qualitative impact assessment functions (e.g. for simulation-based impact assessment for floods).	

Table 2-14: Technical Requirement TR_SA_19

Requirement ID:	TR_SA_19
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_21
Description:	
The ISAS shall allow to filter ISA information (simple filtering), e.g. for total number of people at risk.	
Rational: The user needs to request customizable situational information depending on his role, goals and needs.	
Stimulus: The client (e.g. SP) requests only a sub-part of the impact summary which shall contain only the selected ISA information type.	
Response: ISA information with the selected ISA information type.	
Verification Criterion: The system returns only the ISA information which has been requested	

by filtering, e.g. for total number of people

Notes: none

Table 2-15: Technical Requirement TR_SA_20

Requirement ID:	TR_SA_20
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_22
Description:	
The ISAS shall allow to build queries for selective risk assessment (advanced filtering). For instance it shall be possible to request the most populated buildings in an area around a river.	
Rational: Selective analysis and comparison of aggregated numbers in different areas is useful for users to prioritize actions during response when multiple incidents or ignition points are present.	
Stimulus: The client (e.g. SP) requests an impact summary which shall contain only the selected ISA information specified in a query.	
Response: ISA information with the selected ISA information specified in a query.	
Verification Criterion: The system returns only the aggregated information specified in a query.	
Notes: none	

Table 2-16: Technical Requirement TR_SA_21

Requirement ID:	TR_SA_21
Related SR(s):	<ul style="list-style-type: none"> • Sys_SADS_1 • Sys_SADS_18
Description:	
The ISAS shall generate and provide the <u>number of people at risk for each GOI</u> in the returned list of potentially affected GOIs in an AOI. ISA information is compiled by intersecting the exposure layers with the outputs of the impact assessment component and a pre-selected AOI. No further data enrichment shall be performed.	
Rational: The user shall be supported in their situation awareness by ISA information generated by the system. This enables the user, upon modifying inputs and conditions, to better anticipate the different resulting impacts to the population and to share ISA information, e.g. for planning.	
Stimulus: After running a simulation and simulation-based impact assessment the SP requests the generation of ISA information for a selected AOI, the active scenario, and impact assessment results.	
Response: The ISAS returns the number of potentially affected people for each GOI in the returned list of GOIs in the AOI for the active scenario, e.g. for display in the UI or for inclusion in a situation report.	
Verification Criterion: ISA information describing the number of affected people for each GOI in the returned list of GOIs in an AOI can be requested	

Notes: none

Table 2-17: Technical Requirement TR_SA_22

Requirement ID:	TR_SA_22
Related SR(s):	• Sys_SADS_25
Description:	
The ISAS shall allow the user to get a list of affected buildings (i.e. GOIs) including impact information and coordinates in a tabular format, e.g. Comma-separated Values (CSV) file.	
Rational: The user shall be supported in managing and sharing of ISA information.	
Stimulus: The SP requests the impact summary in a tabular format.	
Response: The ISAS returns the impact summary for affected GOIs in a tabular format.	
Verification Criterion: ISA information describing impact to GOIs is provided by the system in a tabular format, e.g. CSV.	
Notes: none	

Table 2-18: Technical Requirement TR_SA_23

Requirement ID:	TR_SA_23
Related SR(s):	• Sys_SADS_26
Description:	
The ISAS shall allow the user to select a specific type of building (e.g. school or hospital) and get a tabular list of these affected buildings including impact information and coordinates. The list shall be sortable with the possibility to apply filters.	
Rational: The user shall be supported in their response planning by customized ISA information generated by the system.	
Stimulus: After running a simulation and simulation-based impact assessment the SP requests the generation of ISA information for a selected AOI, the active scenario, the selected type of building and impact assessment results.	
Response: The ISAS returns the affected GOIs of the specified building type.	
Verification Criterion: ISA information describing impact to GOIs based on user input is provided by the system.	
Notes: none	

2.2.3 Long-Term Features

Table 2-19: Technical Requirement TR_SA_13

Requirement ID:	TR_SA_13
Related SR(s):	• Sys_SADS_28

Description:

The ISAS shall provide means for modifying the ISA information on potential cascading effects/hazards.

Rational: The user shall be able to modify ISA information according to his/her knowledge in order to increase precision, consistency and reliability of the ISA information.

Stimulus: The user updates existing ISA information for a selected scenario over the UI.

Response: Status OK if modification successful, otherwise error status message

Verification Criterion: ISA information can be modified at any time

Notes: none

3 Reference Architecture

This section describes the ISAS and SITREP components in the context of the overall HEIMDALL architecture. Afterwards, the different inputs and outputs expected from the components are listed. Finally, the section describes the interfaces needed to allow the components to communicate with the other components.

3.1 HEIMDALL Overall Architecture

Figure 3-1 illustrates the HEIMDALL overall architecture highlighting the ISAS and SITREP components as well as their sub-modules are treated as a “black box” within the overall architecture. As can be observed in the diagram the ISAS performs all communication and interactions with the other components of HEIMDALL through the SP. Interface 3 (I3) serves as the general interface. The SITREP as a sub-module of the SM communicates and interacts over interface 8 (I8).

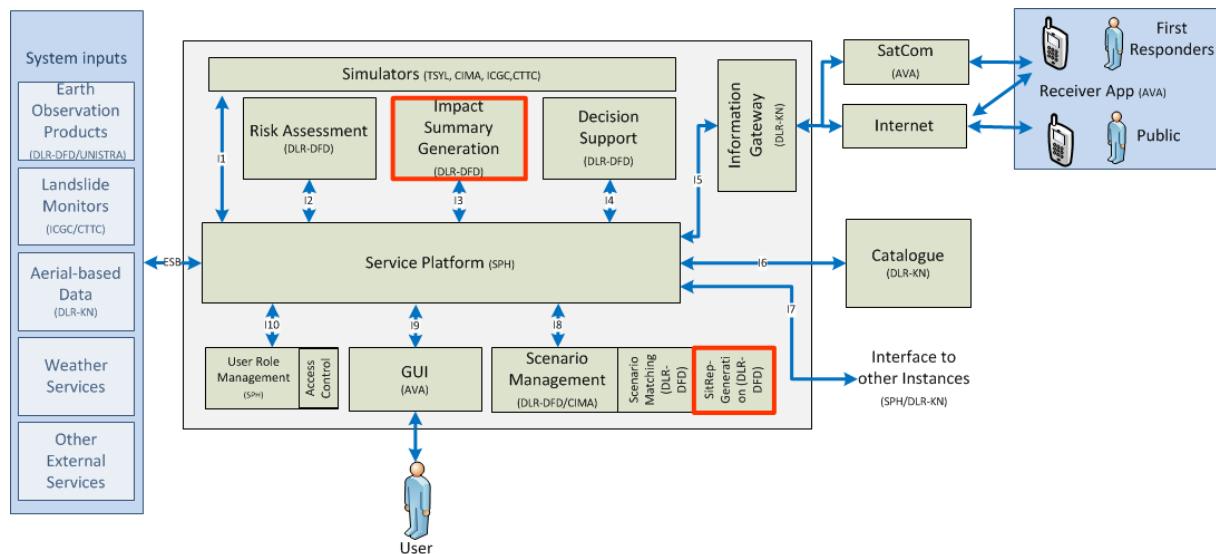


Figure 3-1: HEIMDALL overall architecture

The ISAS enables clients (e.g. the UI) to generate aggregated ISA information for a specific scenario. ISA information supports end users in C&Cs and FCPs to identify risks to people, property and environment and to decide on the working strategy for the response plan formulation to come.

3.2 Inputs and Outputs

Table 3-1 gives an overview of ISAS inputs and outputs with a short description respectively. The products GOIs at risk, people at risk and potential cascading effects and interacting hazards are generated for a pre-defined AOI each. Please refer to section 4.2.1 for details on the GOI concept. A detailed description of ISAS inputs, outputs and formats can be found in section 5.2. Table 3-2 describes SITREP inputs and outputs. Details are specified in section 5.3.

Table 3-1: ISAS inputs and outputs

Output	Short description	Inputs needed	Format
GOIs at risk – summary and list	Summary - total numbers of affected GOIs (i.e. buildings resp. roads) in a pre-defined AOI: <ul style="list-style-type: none"> • Total number of GOIs at 	Pre-defined AOI Expert configuration (e.g., levels of detail, hazard level thresholds, prioritization of infrastructure, etc.); GOIs georeferenced in GeoJSON	Descriptive JSON-based format GOIs georeferenced in GeoJSON

	<p>risk</p> <ul style="list-style-type: none"> • Total percentage of GOIs at risk • Max. physical damage in percent • Total economic damage in EUR <p>List of affected GOIs; For each GOI:</p> <ul style="list-style-type: none"> • Physical damage in percent • Shelter: yes/no • Response-oriented facility: yes/no • Prioritization: None/Significant Infrastructure/Critical Infrastructure/vulnerable element 	<p>Criteria have been defined together with WP3.</p> <p>Exposure datasets including parameters describing GOIs (from T6.1)</p> <p>Physical and economic impact assessment (RVA) information (damage on a per-building resp. road level) (from T6.2)</p>	format and in tabular CSV format
People at risk summary and list	<p>Summary - Total numbers in an AOI:</p> <ul style="list-style-type: none"> • Max. day-time population affected • Max. night-time population affected <p>For each GOI (see Output "GOIs at Risk"):</p> <ul style="list-style-type: none"> • Population affected day • Population affected night • Population affected linear <p>Applies to GOI type building only</p>	<p>Pre-defined AOI</p> <p>Expert configuration (e.g., classification into day and night); Criteria have been defined together with WP3.</p> <p>Exposure datasets including parameters describing GOIs (from T6.1)</p> <p>Human impact assessment (RVA) information (Risk on a per-building) (from T6.2)</p>	<p>Descriptive JSON-based format</p> <p>GOIs georeferenced in GeoJSON format and in tabular CSV format</p>
Potential cascading effects/ hazards	<p>Estimated potential hazards and cascading effects which might be caused when GOI gets damaged or collapses (e.g. bridge at risk; based on pre-defined interacting hazards in case studies)</p> <p>For each GOI (see Output "GOIs at Risk"):</p> <ul style="list-style-type: none"> • Potential source for cascading effects: yes/no 	<p>Pre-defined GOI(s) defining the AOI</p> <p>Expert configuration (e.g., predefined cascading effects, potential sources) specified in the exposure datasets (in T6.1); Criteria have been defined together with WP3.</p> <p>Exposure datasets including parameters describing GOIs (from T6.1)</p> <p>Physical impact assessment (RVA) information (damage on a per-building resp. road level) (from T6.2)</p>	<p>GOIs georeferenced in GeoJSON format and in tabular CSV format</p>

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Table 3-2: SITREP inputs and outputs

Output	Short description	Inputs needed	Format
Standards-based situation report	Scenario snapshot containing the parameters of the current situation in a descriptive format for standards-based sharing	Scenario snapshot	Standardized XML-based message format EDXL-SitRep

3.3 Interfaces with other HEIMDALL components

The ISAS and SITREP provide access to their data resources and functionality by use of a RESTful web service interface. Figure 3-1 shows I3 as the major interface connecting the SP with the ISAS and I8 as the general interface connecting the SP with the SITREP (see Table 3-3 for details on I3 and I8).

Table 3-3: Interfaces with other components

Interface	Short description	Methods	Protocol
I3	RESTful web service interface	GET, POST, PUT, DELETE	HTTP(S)
I8	RESTful web service interface	POST	HTTP(S)

The ISAS and SITREP as web services provide a REST API for accessing, creating, updating and deleting their data resources. Any input needed by the components must be attached as a data resource by the client to the request.

4 Module Functionality

HEIMDALL situation assessment (SA) services aim at providing relevant information products in the process of response planning, in particular in strategy building. End users need information which supports them in understanding the situation, for anticipating the potential situation evolution, the consequences of impacts on people and property as well as cascading effects and hazards as a basis for taking informed decisions on the best-possible working strategy.

This chapter starts with background, motivation and objectives of task T6.3 in the next section, followed by a more technical overview of functionalities, architecture and interfaces in subsequent sections.

4.1 Situation Assessment in Response Planning

SA forms a major pillar in the decision making of emergency managers in preparedness, prevention and response phases, as outlined in the HEIMDALL service concept [4].

4.1.1 Situation Awareness Information

Maintaining a sound and complete situational awareness (SAW) of an emerging or occurring disaster is an essential prerequisite for effective decision making to prevent a disaster from occurring and to minimize the consequences of a disaster. The established SAW model developed by Endsley [5] shown in Figure 4-1 focuses on *the perception of 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*. The theoretical model consists of the three consecutive stages *perception, comprehension and projection* to generate SAW (step one) which build the mental foundation for reasonable *decision making and acting* (step two). In brief, SAW is viewed as "a state of knowledge," and SA as "the processes" used to achieve that knowledge. Endsley argues that "it is important to distinguish the term situation awareness, as a state of knowledge, from the processes used to achieve that state". These processes, which may vary widely among individuals and contexts, will be referred to as SA or the process of achieving, acquiring, or maintaining SAW.

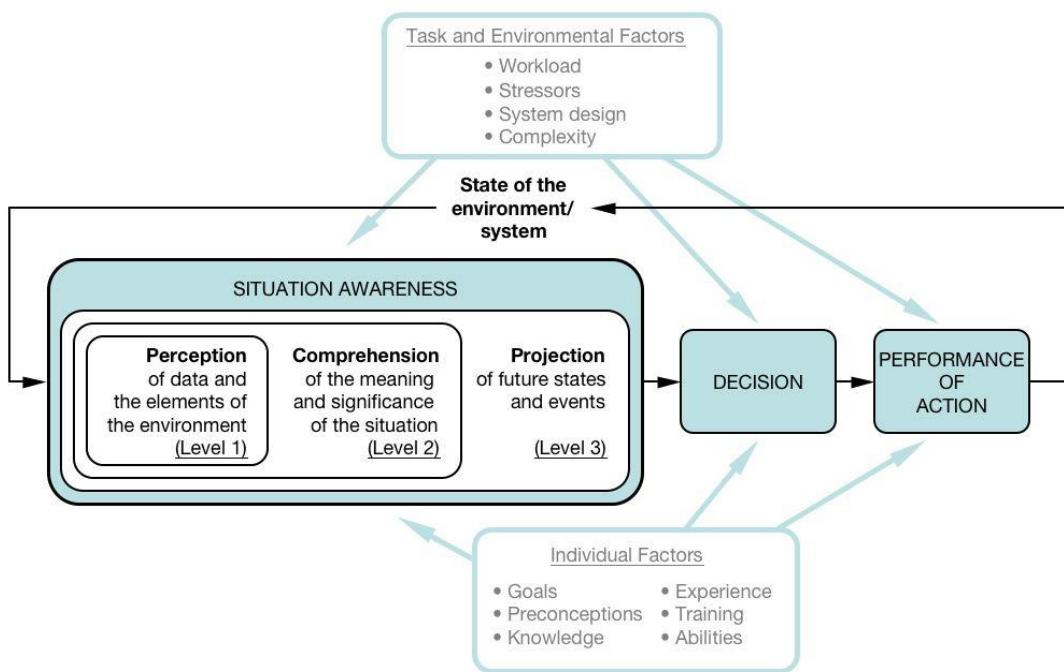


Figure 4-1: The Situation Awareness Concept by Endsley [5]

Information technology can assist decision makers in the SA process. In the German-Indonesian Tsunami Early Warning (GITEWS) project DLR-DFD has designed and developed a SA and decision support (DS) workflow for the Decision Support System (DSS) of the Indonesian Tsunami Early Warning System InaTEWS [6],[7]. In the Project on a Multi-Hazard Open Platform for Satellite Based Downstream Services (PHAROS) we have refined and applied the workflow to the wildfire domain [8]. The PHAROS DSS is a central component which integrates all incoming sensor and human-generated information with simulation results and pre-compiled data sources to generate and constantly update the situational picture for a natural disaster situation in order to improve the SAW and reasoning of the involved operators and responders. Figure 4-2 outlines the SA and DS workflow elaborated in the PHAROS project.

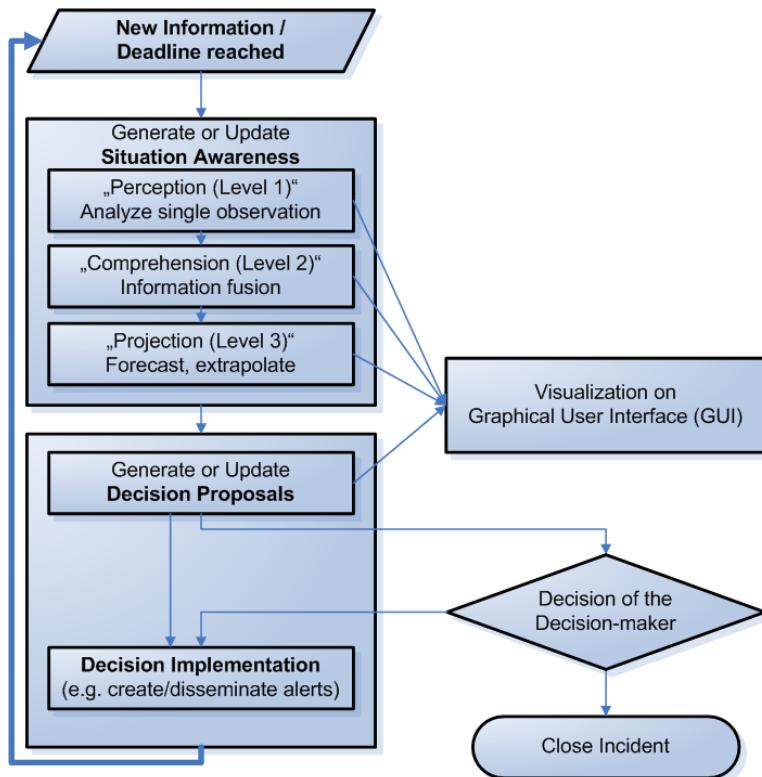


Figure 4-2: The core SA and DS workflow in PHAROS [9]

In HEIMDALL, we investigate which SAW information is needed most and in which form with the support of the different involved stakeholders to identify risks to people, property and environment and to decide on the working strategy for the response planning to come. An analysis of the key phases of decision making - SA, plan formulation (PF) and plan execution (PE) - performed by Cohen-Hatton et al. revealed that assessment of the operational situation was most often followed by PE rather than PF, and there was little evidence of prospection about the potential consequences of actions [10]. As a consequence decision making did not follow the sequence of phases assumed by normative decision making models and conveyed in current operational guidance but instead was influenced by both reflective and reflexive processes. Case studies on the assessment of emergency plans for floods revealed a need for further elaboration of supporting relevant information in the process of emergency planning [11]. The major issues identified included the importance of having information on demographic numbers, on the location of vulnerable infrastructure and people and of being able to connect the different automated systems used by the different parties involved in emergency planning. These findings are in line with studies which DLR-DFD has conducted in order to examine which information needs to be represented in a strategic planning scenario to improve activities in the response planning process for complex multi-hazard crisis situations, specifically weather-related events [12]. Accordingly, major relevant information includes information on where physical impacts are likely to occur, how they are expected to have an effect on people and buildings, and what measures,

resources and forms of organization are needed in order to reduce the consequences. As a consequence, these information elements have been added to the HEIMDALL scenario definition. Figure 4-3 summarizes the mentioned and further relevant SAW information items developed in HEIMDALL in the context of strategic response planning.

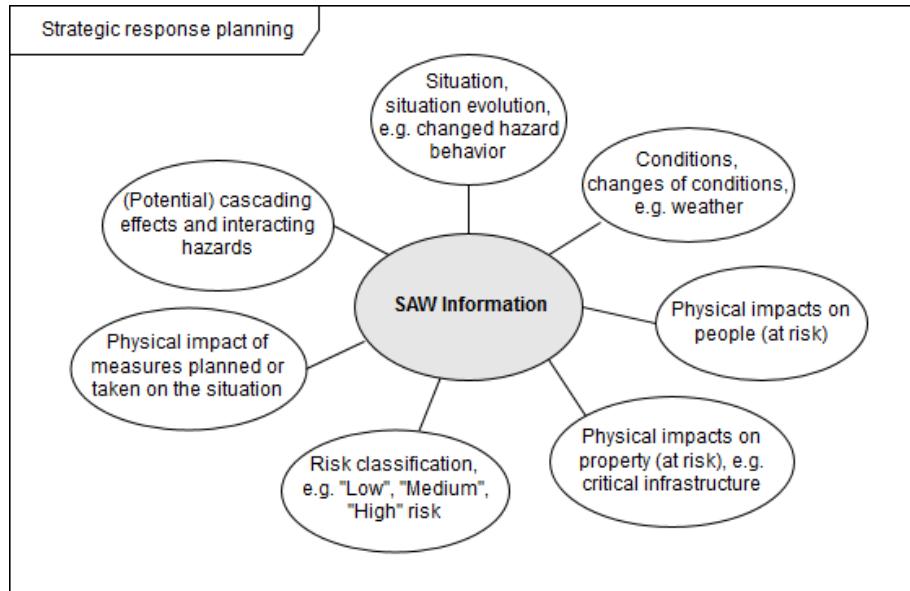


Figure 4-3: SAW information relevant for strategic response planning

Activities supporting decision making in short-term and long-term scenario-based response planning involving these SAW information elements include:

- Spatio-temporal SA: The situational picture (i.e. SAW information) can be saved at different points in time in scenario snapshots enabling tracking and reproduction of the situation evolution and changes in the environment such as changing weather conditions; Multi-temporal post-event satellite data can be used to give an assessment of the evolution of the event extent and impact; Changes in land cover and land use over time can be detected and formalized using satellite data
- Risk and Impact Assessment: Relevant information includes information on risk for people and property, risk classification, potential multi-hazard and cascading effects and impact of measures planned or taken.
- Scenario Matching: SAW information elements can be used as comparison criteria.
- Multi-incident management: Scenarios and scenario snapshots include references to related scenarios and incidents; Multi-hazard and cascading effects are considered in risk and impact assessment products
- Analysis of possible future scenarios: SAW information improves situation and risk assessment for fictive situations.
- Cooperation and communication: SAW information in a standardized situation reporting format facilitates interoperability.

Different HEIMDALL tasks take care of the different services and products listed above:

- T6.1 provides concepts and T6.2 the technical implementation of multi-hazard impact assessment products, services and workflows
- T6.3 aims at improving and developing tools for the management and standards-based provision of relevant, aggregated SAW information for specific areas of interest.
- T6.4 contributes SAW information for the analysis of options and contingencies and information on changes in land cover and land use over time

- T6.5 takes care of multi-hazard scenario and incident management, replay and matching

4.1.2 Service-based Approach to SA and DS

In HEIMDALL, we are following the general shift in environmental systems, disaster management in particular, from isolated monolithic implementations to highly robust and functionally distributed information provision and processing system approaches. Encapsulating SA and DS functionalities in individual web services is required for multi-disciplinary response planning which usually involves various groups of stakeholders in need of different combinations of services.

Over the last decade, web services have become a major technology for implementing a loosely coupled architecture. In particular, the REST (REpresentational State Transfer) architectural style has emerged over the last years as a very popular approach for implementing web services which expose RESTful APIs (Application Programming Interface) based on the HTTP protocol [13],[14]. In addition to custom RESTful APIs, there is an established body of interface standards available from the International Organization for Standardization (ISO), the Open Geospatial Consortium (OGC), the World Wide Web Consortium (W3C) and Internet Engineering Task Force (IETF) for interoperable data access and exchange. Visualization, vector and raster data access, along with the ability to search for spatial data is mostly covered by the standards provided by OGC such as the Web Mapping Service (WMS), the Web Feature Service (WFS), the Web Coverage Service (WCS), and the Catalog Service for the Web (CSW).

The different HEIMDALL SA and DS building blocks have to be provided as individual web services which can be used in different combinations by different human and machine users. Therefore, the different simulation tools, the RVA module, the ISAS, (Decision Support Service) DES and SITREP components all designed as capsule web services.

4.1.3 sCOP and Standardised Information Exchange

The two major challenges in the management of disasters lie in improving procedural/organizational and semantic interoperability [20]. In studies it has been pointed out by the practitioners that there is a need for an improved standardization and sharing of SAW information, response plans and disaster scenarios, both, across different groups within an organization and to other involved stakeholders. Use cases for sharing of disaster information include their usage in staff meetings, their distribution to incident commanders at FCPs, to the media, and their application in exercises and training.

Consolidation and interoperable exchange of situational and disaster management information by all involved responders has been addressed in research by the development of a COP [15]. Each system actor, both human and machine, may contribute to this pool of information which ensures that the same information is presented to all responders across different organizations, at all times, in a consistent fashion. In addition, individuals are able to off-load knowledge to that information pool to reduce the mental load associated with remembering the information presented by other agencies as suggested by various SA theories [16],[17],[18]. A similar concept has been developed recently in European projects such as EPISECC and SecInCoRe focusing on improving multi-integrated electronic information management in multi-organizational scenarios by the use of a Common Information Space [19],[20]. In the PHAROS project, DLR-DFD has evaluated existing state-of-the-art message formats for COP information and developed and implemented the shared Common Operational Picture format (sCOP). The PHAROS sCOP is an extension to the Emergency Management Shared Information (EMSI) message structure [21] and its extension Alerting COP (A-COP) developed in the A4All project [28]. In terms of domain coverage, we have identified these formats to be the most suitable data structures for the collection and exchange of SAW information in disaster response.

Under consideration of the shifted focus of the HEIMDALL project towards collaborative response planning and exchange of scenarios, COP concepts and emergency messaging

standards had to be re-evaluated. In the sense of a sCOP, HEIMDALL scenarios can act as pools for information and knowledge and the HEIMDALL system should support end users to manage these pools of knowledge efficiently in a collaborative manner. This would help feed them with relevant information to close the gaps in the situational and operational picture as it evolves, to use them as a source of information for the generation, evaluation and modification of response plans, and finally to disseminate these response plans to the different involved stakeholders. Consequently, functionalities will be developed for the transformation of scenario information into a standardized situation report message format with increased capabilities for the specification of situational status, risk assessment, possible future alternatives or strategical decisions. These functionalities are introduced in short in the next section and described in detail in section 5.3.

4.2 Functionalities

Based on the objectives described in the former section these SA functionalities can be accessed for different purposes in the response planning process:

- Generation of aggregated *Impact Summary Information (ISA Information)* by the **Impact Summary Service (ISAS)** for pre-defined target areas on relevant infrastructure and people at risk and on potential cascading effects and interacting hazards which supports, together with simulation and RVA tools the evaluation of simulated options during the analysis of possible future scenarios (what-if analysis)
- Transformation of a scenario snapshot into a standardized situation report by the **Situation Report Generation Service (SITREP)** in the EDXL-SitRep message format containing all information relevant for collaborative SAW, strategy building, communication and information sharing

4.2.1 Impact Summary for Geographical Objects of Interest (GOIs)

As a major concept of the ISAS an impact summary is generated for a user-defined AOI with GOIs which can be seen as locations of interest with an arbitrary geometry. Accordingly, a GOI can represent a point, a line, or a polygon. In addition, end-user specific attributes enable the strategic prioritization of a GOI and classification into shelter, response-oriented infrastructure, significant infrastructure, critical infrastructure or vulnerable element. This structural flexibility enables users to specify different geographical targets for the information aggregation to come. For example, users are able to:

- Request an impact summary including a list of affected significant and critical infrastructure in an administrative area
- Request an impact summary including a list of affected vulnerable buildings for an area around a river which is most likely to be affected by a flood
- Request an impact summary for a slope which is exposed to a landslide hazard which gives an overview of the susceptibility of infrastructure in that specific area
- Request an impact summary for a buffer around a response team location or an FCP for localized impact assessment

The ISAS integrates different layers of information provided by end users and other HEIMDALL modules to generate an impact summary for these GOIs.

In addition to ISA information, response-oriented Decision Support Information (DES information) is generated by the DES on potentially save (response-related) infrastructure in a GOI which supports the identification of options and contingencies. The DES module is specified in D6.11 [29].

4.2.2 Impact Summary and Situation Reports as Tools for the Analysis of Future Scenarios

For end users, the most prominent decision making activity they perform in their everyday work is the analysis of possible future scenarios sourcing from different foreseen hazard evolutions and potential measures of prevention and control in order to explore the consequences of impacts and measures to be performed in these options. The HEIMDALL system can assist decision makers to generate alternative scenarios and simulations (using scenario management functions) and assess their potential evolution and consequences using simulation, RVA and ISAS functions. Decision makers such as incident commanders in the field can display and explore these alternative scenarios and simulations in a UI or browse through them when they are presented in the form of a situation report (e.g. based on SITREP). Based on such a situation report which contains a comparison of the top best-fitting planning scenarios, each with relevant information on the projected hazard behaviour and consequences, their knowledge of the context and their experience they are able to take an informed decision on the best-fitting scenario option and the appropriate working strategy.

4.3 Iterative and Incremental Design

ISAS, SITREP and DES have evolved with the knowledge and experience gained in collaboration with the end user partners and Advisory Board (AB) members involved in the project. The functionalities and specifics described in this document reflect user requirements identified and iteratively updated throughout the HEIMDALL project. In particular, product previews and exercises with the end user partners at the EUWs have been very fruitful sources for evaluation, identification of further use cases and requests for improvements. For example the GOI concept has been revised to allow for a) the provision of a list of affected GOIs and b) aggregation of ISA information on AOI level.

4.4 Architecture

The ISAS consists of the actual web service component and a database as shown in Figure 4-4. The ISAS as a RESTful web service provides a HTTP-based REST API which allows clients such as the HEIMDALL SP to communicate with the service.

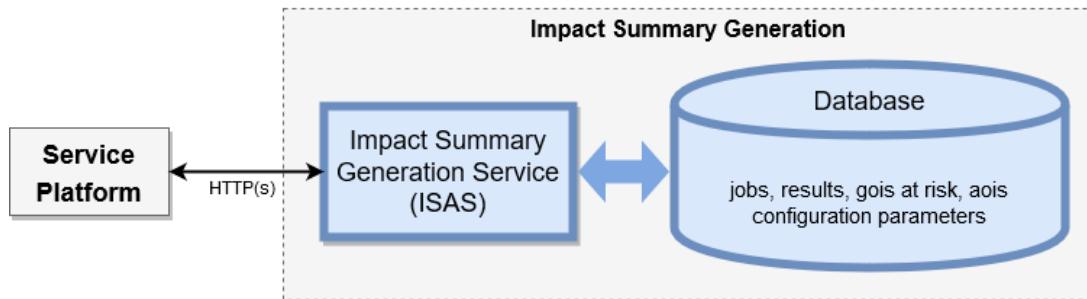


Figure 4-4: ISAS modules

The SITREP module has been implemented as a standalone module included into the SM architecture. Figure 4-5 outlines its position in the SM architecture. Other than planned in the first phase the SITREP module does not access the scenario repository directly. Moreover, in order to be independent from the physical instance of the scenario management module SITREP receives the respective scenario snapshot to be transformed into a standards-based messaging format over its REST API. Over the same API results can be accessed by external clients.

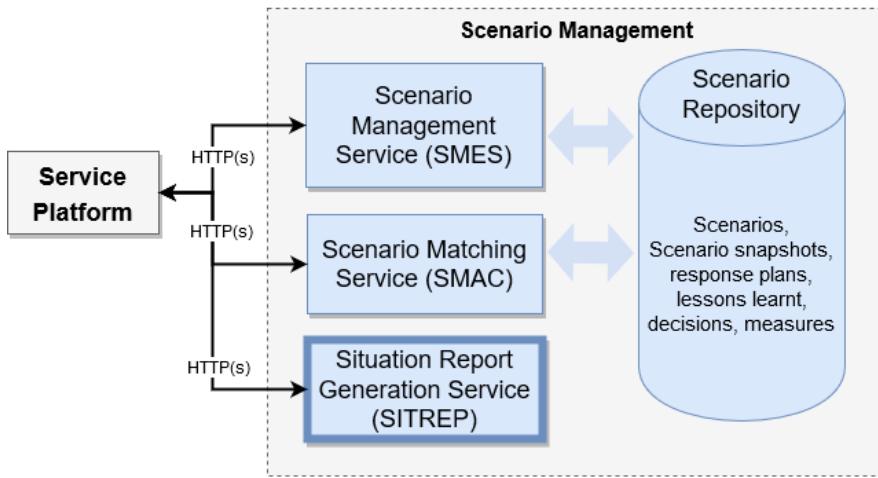


Figure 4-5: Scenario management modules with the SITREP module being highlighted

For more information on the SM please refer to deliverable D6.15 Scenario Specification, Scenario Management Specification and Scenario and Situation Metrics – Final [22].

4.5 Data Model

The ISAS component manages and gives access to the following data resources: jobs, AOIs, GOIs, results, input and configuration elements. The relations between the data entities have been elaborated while the component design has matured. Figure 4-6 illustrates the final ISAS data model.

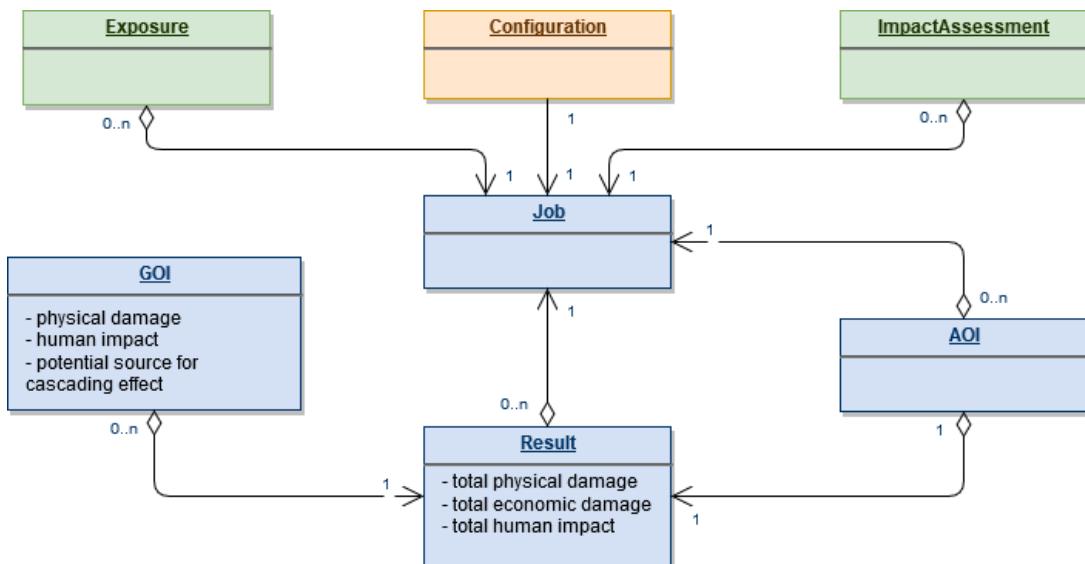


Figure 4-6: ISAS data model with the job resource as major entry point, with input sub-resources (green), configuration (orange) and product sub-resources (blue)

Accordingly, a job can be composed of different input sub-resources, a configuration and multiple job outputs which are linked to each other by the results, resource (namely GOIs), people, cascading effects and situation evolution elements. In this final version of the data model, the input sub-resources Exposure and Impact Assessment define the input for the ISA information generation process. Configuration contains hazard-agnostic and user-specific parameters. As a fourth input entity AOIs are created. Once the ISAS process has been completed one result object per AOI is linked to the job and AOI. Result contains the computed summary attributes and is linked to a list of GOIs.

The scenario data model used by the SITREP module is described in D6.15 [22].

4.6 REST API Conventions

The ISAS REST API communicates using JSON as the primary data-interchange format. The format is based on shared conventions for designing web APIs, namely the JSON API conventions [30]. Based on common procedures and technologies in web development the ISAS API documentation has been built and deployed together with every software release. This way, the API documentation remains always up-to-date.

The ISAS module has been installed in the HEIMDALL VPN and is therefore accessible over an URL like this:

```
http://esb.heimdall.sp/services/rest/isas/
```

Therefore, all URLs used in the examples in the following part of this document refer to this global URL. For example, the request

```
POST /jobs HTTP/1.1
```

would be resolved to

```
POST http://esb.heimdall.sp/services/rest/isas/jobs HTTP/1.1
```

4.7 Workflows

This section describes a set of overarching workflows in order to foster a deeper understanding of how the ISAS and SITREP components work in the context of other HEIMDALL software modules. Sections 5.2.1 and 5.3.1 describe the information flow of ISAS and SITREP in detail.

4.7.1 Situation Assessment Workflow

Tool-assisted SA in HEIMDALL is a composition of user events and HEIMDALL tool activities. Figure 4-7 illustrates the general HEIMDALL-assisted SA workflow.

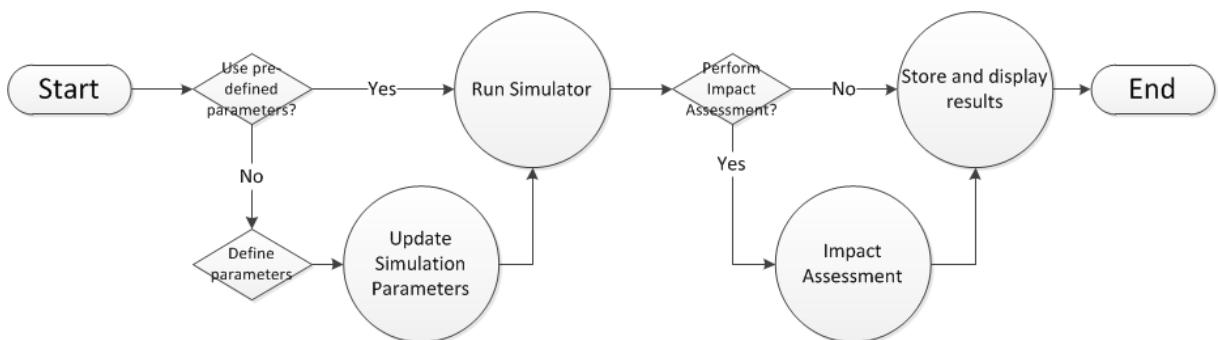


Figure 4-7: HEIMDALL SA workflow

The workflow starts with a simulation run triggered and configured by a client, e.g. the user. Simulation results are used as an input for HEIMDALL-assisted impact assessment. Results are stored and displayed in the user interface. Impact summary generation is part of the impact assessment activity and makes use of other products generated here such as physical and human impact assessment products.

Impact assessment takes care of providing exposure information, impact assessment information (both developed by T6.1 and T6.2) and ISA information. ISA information combines the latter information products (including simulation results) and provides an aggregated description, e.g. of impacts on GOIs and population.

4.7.2 Situation Report Generation Workflow

Depending on the scenario status (the data and information which is available for a scenario at a specific point in time) different versions of a situation report can be generated. For example, if the scenario contains a list of what-if simulations that list will be attached to the situation report.

A situation report is generated for a scenario snapshot. Figure 4-8 shows the general situation report generation workflow.

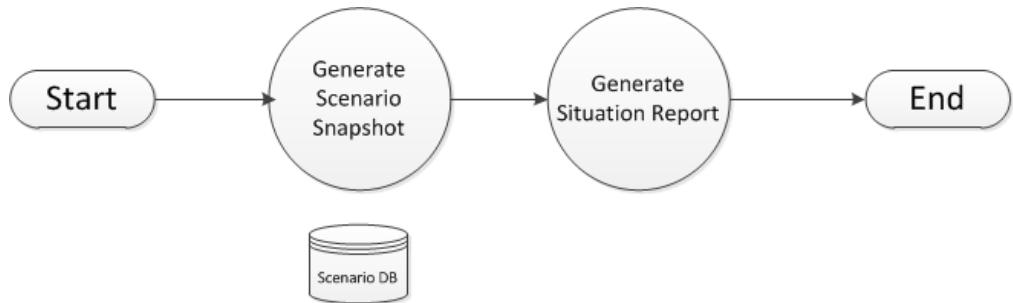


Figure 4-8: HEIMDALL situation report generation workflow

First, the system creates a new scenario snapshot (functionality developed by T6.5). This scenario snapshot is provided by SITREP in the specified message format.

Situation reports are generated at different points in the lifetime of a scenario. Figure 4-9 shows the reference workflow with situation reports and the respective contents.

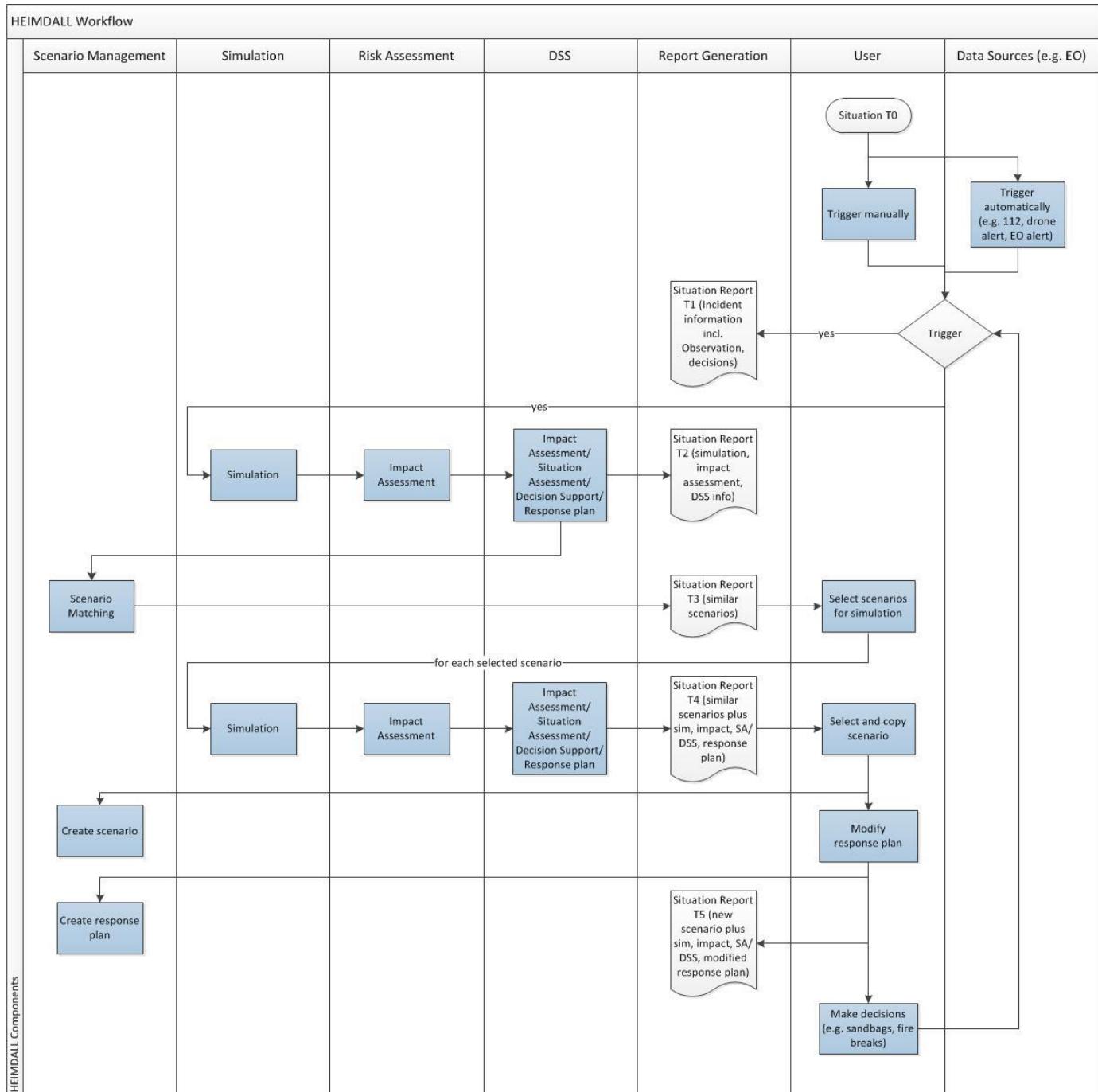


Figure 4-9: HEIMDALL situation reports at different points in the lifetime of an ongoing scenario

5 Technical Specification

5.1 Multi-Criteria Impact Summary Metrics

The ISAS makes use of pre-defined criteria and metrics in order to generate the most useful ISA information as a basis for situational awareness and decision making. Through the diversity of end users in terms of different legal frameworks, national, regional and organizational strategies, roles and profiles, these criteria and metrics depend strongly from the stakeholders which shall be addressed. Therefore, it's fundamental to identify common and individual criteria and metrics for the different stakeholders to be supported by the ISAS. These criteria and metrics will be incrementally developed and evaluated in collaboration with the end user partners. Discussions have revealed a need for the consideration of the following criteria and metrics:

- Specification of AOI, e.g. selection of a specific area around a flooded river
- Different selections of GOIs
- Different rankings of infrastructure in terms of criticality (Critical infrastructure, significant infrastructure, vulnerable elements)
- Different distributions of population per GOI depending on day time or night time
- Determination of GOIs as potential sources for cascading effects and interacting hazards (e.g. landslide may cause a bridge to collapse which may cause a flash flooding)
- Different ISA information products of interest, different product attributes of interest
- Different thresholds (e.g. minimum flood height to be considered, maximum arrival time of the fire front to be considered)
- Different classification depending on the hazard type

The different configuration methods and options developed and implemented for the ISAS are described in section 5.2.4 Configuration.

5.2 Impact Summary Service (ISAS)

The ISAS provides a REST API which enables clients to trigger the ISA information generation process and to access and modify ISA information products. The specification in this chapter relates to the final implementation of short- and mid-term requirements. As such it provides a more detailed design of functionalities related to GOIs at risk.

5.2.1 Information Flow

The ISA information generation process and the interactions to other HEIMDALL modules are outlined in Figure 5-1. Components, ISAS data resources and functionalities shown in the sequence diagram are described in detail in the next sections.

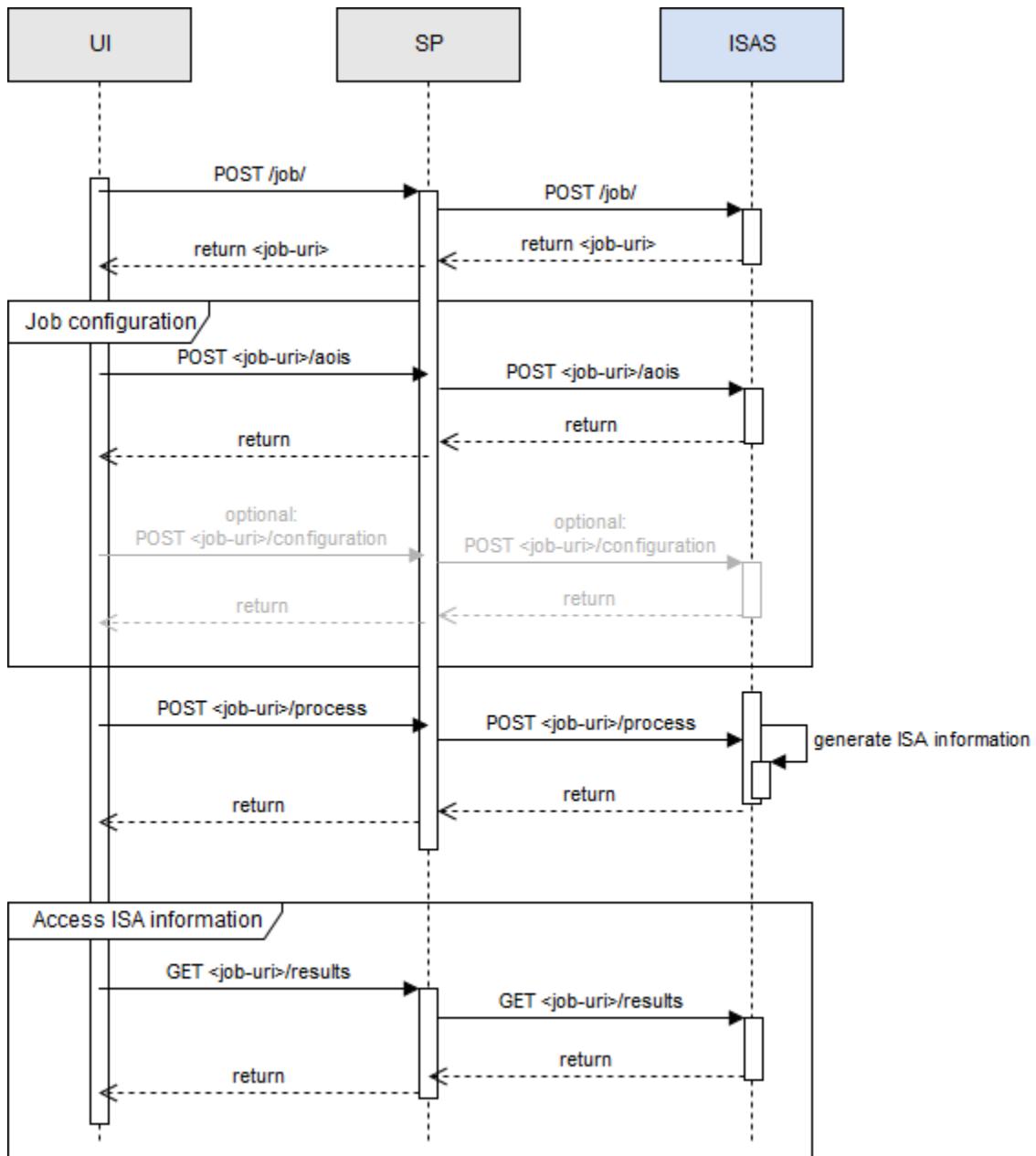


Figure 5-1: General ISAS workflow

5.2.2 Information Fusion

ISAS makes use of several external data sources. Due to the diversity of end users in terms of different legal frameworks, storing the impact assessment or the exposure data was found not very feasible. Although SQL is far more expressive and efficient to use than other methods such as Django models or geospatial intersections, the current implementation had to be based on the latter approach. DB join operations require the input information being available in the ISAS database. Therefore, the client is required to add all the necessary chunks of information to be correlated to a job before the ISAS process starts. This is currently not possible due to the distributed nature of the system.

Figure 5-2 outlines the integration of all information necessary for the ISAS process. The presence of input parameters and configuration in the database fosters transparency and history management of all related products. In particular, expert configuration of criteria and metrics needs to be transparent and traceable for every ISAS job.

The following HEIMDALL information products are used by the ISAS:

- Human and physical exposure products such as exposed date-time and night-time population, building type, predominant building use and transportation network (see D6.1 [25])
- Observation-based human and physical impact assessment products (see D6.5 [26])
- Simulation-based human and physical impact assessment products such as the physical percentage damage to the building structure, the economic damage for structure and content of the buildings (see D6.5)
- Multi-hazard impact assessment products such as cascading effects and interacting hazards (see D6.1)

The following pre-defined information is used by the ISAS:

- Pre-defined AOIs
- Job configuration

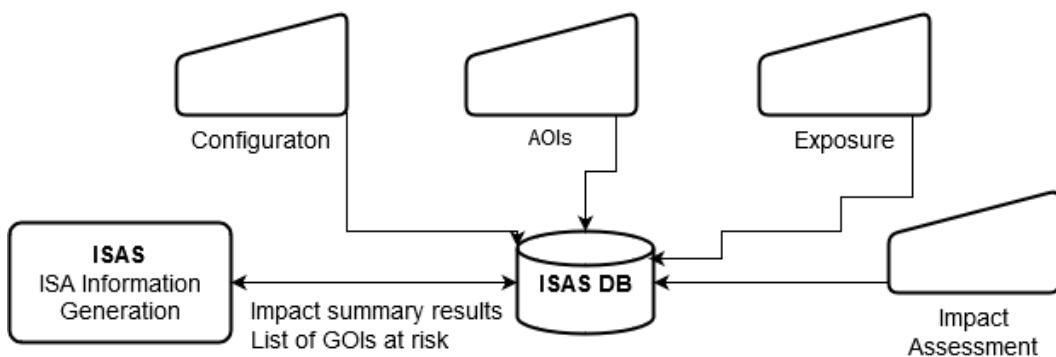


Figure 5-2: Information integrated for the generation of ISA information

5.2.3 Jobs

When a client (e.g. UI) wants to trigger the generation of an impact summary, a job must be created. A job resource contains the configuration of a job including all information required to perform the job, i.e. pre-defined AOIs, exposure, impact assessment, etc. Additional information like the results and the configuration is added to the “relationships” element. Table 5-1 shows the job data structure.

Table 5-1: ISAS job parameters

Parameter	Short Description	Values	Type
			Usage
Identifier	Unique identifier	String representation of any Unique ID	String Automatic generation if not set JSON: “data.id”
Link	Globally unique identifier	Unique resource identifier	String Automatic generation if not set JSON: “links.self”
Created Time	Date and time the job has been created	Timestamp	Date JSON: “data.created”

Status	Status of the job	pending, done, updated	Enumeration
			JSON: "attributes.status"
Impact Assessment	Unique resource identifier for the IA result	OGC WFS Version 1.0.0	String
			JSON: "attributes.impact_assessment"
Exposure Data	Unique resource identifier for the exposure	OGC WFS Version 1.0.0	String
			JSON: "attributes.exposure_data"

For example, the following request creates a job:

```
POST isas/job HTTP/1.1
Content-Type: application/vnd.api+json
Accept: application/vnd.api+json
```

With the body:

```
{
  "data": {
    "type": "job",
    "attributes": {
      "impact_assessment": "http://esb.heimdall.sp/services/rasorogc/ows?service=WFS&version=1.0.0&request=GetFeature&typeName=rasor:impact_636972303258305339&outputFormat=application/json",
      "exposure_data": "http://esb.heimdall.sp/services/ogc/heimdall/ows?service=WFS&version=1.0.0&request=GetFeature&typeName=heimdall:building_model_monesi&outputFormat=application/json"
    }
  }
}
```

The response could look like:

```
HTTP/1.1 201 Created
Location: http://esb.heimdall.sp/services/rest/isas/job/2b12a8c9-3d00-439d-bbb5-f09282229c48
Content-Type: application/vnd.api+json
```

With the body:

```
{
  "data": {
    "type": "job",
    "id": "2b12a8c9-3d00-439d-bbb5-f09282229c48",
    "attributes": {
```

```

        "creationtime": "2019-02-12T15:52:33.801586Z",
        "status": "pending",
        "impact_assessment":
"http://esb.heimdall.sp/services/rasorogc/ows?service=WFS&version=1.0.0&request=GetFeature&typeName=rasor:impact_636972303258305339&outputFormat=application/json",
        "exposure_data":
"http://esb.heimdall.sp/services/ogc/heimdall/ows?service=WFS&version=1.0.0&request=GetFeature&typeName=heimdall:building_model_monesi&outputFormat=application/json"
    }
}
}

```

5.2.4 Configuration

Criteria and metrics can be configured using two different methods; by adding a configuration to a specific ISAS job resource and by filtering the result against query parameters in the URL.

5.2.4.1 Configuration for Job AOI

For every ISAS job the user can specify at least one AOI. These areas are used to pre-select the GOIs provided in the exposure dataset used in the Impact summary generation process.

The following example shows how to configure one AOI:

```
POST /isas/job/2b12a8c9-3d00-439d-bbb5-f09282229c48/aois HTTP/1.1
Content-Type: application/vnd.api+json
Accept: application/vnd.api+json
```

With the body:

```
{
  "data": {
    "type": "aoi",
    "attributes": {
      "location": {
        "coordinates": [
          [
            [
              [
                2.818047687454907,
                42.430909216561446
              ],
              [
                [
                  2.8159791793928264,
                  42.38050627921706
                ],
                [
                  2.8159791793928264,
                  42.38050627921706
                ]
              ]
            ]
          ]
        ]
      }
    }
}
```

```

        [
            2.9107168486172554,
            42.37989508612668
        ],
        [
            [
                2.909062042167591,
                42.42907709200111
            ],
            [
                [
                    2.818047687454907,
                    42.430909216561446
                ]
            ]
        ],
        "type": "Polygon"
    }
}
}
}

```

The response could look like:

```

HTTP/1.1 201 Created
Location: http://esb.heimdall.sp/services/rest/isas/aois/2b12a8c9-3d00-
439d-bbb5-f09282229c48
Content-Type: application/vnd.api+json

```

With the body:

```

{
    "data": {
        "type": "aoi",
        "id": "d1e17e29-8ca8-49fd-b58b-06a14a8a83d8",
        "attributes": {
            "creationtime": "2020-02-27T12:46:19.461406Z",
            "location": {
                "type": "Polygon",
                "coordinates": [
                    [
                        [
                            [
                                2.818047687454907,
                                42.430909216561446
                            ],
                            ...
                        ]
                    ]
                ]
            }
        }
    }
}

```

```

        [
            2.8159791793928264,
            42.38050627921706
        ],
        [
            2.9107168486172554,
            42.37989508612668
        ],
        [
            2.909062042167591,
            42.42907709200111
        ],
        [
            2.818047687454907,
            42.430909216561446
        ]
    ]
},
"relationships": {
    "job": {
        "data": {
            "type": "job",
            "id": "2b12a8c9-3d00-439d-bbb5-f09282229c48"
        },
        "links": {
            "related": "http://esb.heimdall.sp/services/rest/isas/job/2b12a8c9-3d00-439d-bbb5-f09282229c48"
        }
    }
},
"links": {
    "self": "http://esb.heimdall.sp/services/rest/isas/aoi/d1e17e29-8ca8-49fd-b58b-06a14a8a83d8"
}
}
}

```

5.2.4.2 Configuration for Job Resource

Following the concepts of REST we have identified the design of a configuration as a sub-resource of Job to be the most flexible for HEIMDALL. This design allows for improved (a) applying of many configuration options, (b) customizing ISAS behaviour according user needs and goals, (c) for transparency of configurations, (d) for an association of configurations to the respective jobs and results and thus (e) for history management of configurations. It's up to the client to specify a job configuration according to specific needs. However, it makes sense to define a couple of useful configuration options for a wide range of users. These options have been incrementally developed and evaluated in collaboration with the end user partners. The following configuration options have been identified:

- Different configurations depending on the RVA data model
- Pre-selection of conditions for the ISA generation process such as pre-selection of to-be-examined GOIs according to the exposure data model e.g. roads, buildings
- Pre-selection of GOIs according to the AOI
- Specification of thresholds such as hazard type and impact to be applied to a GOI

As an example, the following configuration resource could be used for the assessment of GOIs at risk:

```
POST /isas/job/2b12a8c9-3d00-439d-bbb5-f09282229c48/configuration HTTP/1.1
```

```
Content-Type: application/vnd.api+json
```

```
Accept: application/vnd.api+json
```

With the body:{

```
    "data": {  
        "type": "job_configuration",  
        "attributes": {  
            "affected_field_name": "indicator_1",  
            "affected_threshold": 0.0,  
            "hazard_field_name": "forcing_29",  
            "hazard_max_threshold": 3.0,  
            "hazard_medium_threshold": 2.0,  
            "hazard_min_threshold": 1.0,  
            "hazard_nodata_value": -9999.0,  
            "economic_damage_field_name": "indicator_80",  
            "goi_type": "buildings"  
        }  
    }  
}
```

The response could look like:

```
HTTP/1.1 201 Created
```

```
Content-Type: application/vnd.api+json
```

With the body:

```
{  
    "data": {
```

```

    "type": "job_configuration",
    "id": "a7753f98-1362-4ee2-aa03-1323a66d0f41",
    "attributes": {
        "hazard_field_name": "forcing_30",
        "hazard_nodata_value": -9999.0,
        "hazard_min_threshold": 1.0,
        "hazard_medium_threshold": 2.0,
        "hazard_max_threshold": 3.0,
        "affected_field_name": "indicator_1",
        "affected_threshold": 0.0,
        "goi_type": "buildings",
        "economic_damage_field_name": "indicator_80"
    },
    "relationships": {
        "job": {
            "data": {
                "type": "job",
                "id": "2b12a8c9-3d00-439d-bbb5-f09282229c48"
            },
            "links": {
                "related": [
                    "http://esb.heimdall.sp/services/rest/isas/job/2b12a8c9-3d00-439d-bbb5-f09282229c48"
                ]
            }
        }
    }
}

```

5.2.4.3 Filtering against Query Parameters

The initial ISAS processing results can be filtered against query parameters and complex searches in the URL. As a result only those elements are returned which correspond to the filter query. For example, the following request returns only GOIs which have been pre-defined as vulnerable elements:

```
GET /isas/result/<some-id>/gois?filter=priority_action_point = 'vuln'
```

It's up to the client to filter according to specific needs. However, it makes sense to define a couple of useful filter queries for a wide range of users. These queries have been incrementally developed and evaluated in collaboration with the end user partners. The filtering and sorting of the list of GOIs can be changed using query parameters as specified in https://github.com/dlr-eoc/rest_framework_filterdsl. All attributes beside location can be used in the query e.g.:

```
http://192.168.127.2/services/isas/result/aecfc46c-475e-49b2-b41d-fa368ea70662/gois?filter=physical_damage >= 50&sort=-pop_affected_day
```

GOIs with a name:

```
http://192.168.127.2/services/isas/result/aecfc46c-475e-49b2-b41d-fa368ea70662/gois?filter=name!='Unknown'
```

5.2.5 Results and GOIs at Risk

ISA information is generated for GOIs in an AOI in order to allow end users to adapt their target for obtaining an impact summary according to their organizational strategies and constraints. The ISAS integrates different layers of information provided by end users and other HEIMDALL modules to generate an impact summary for these GOIs. The resulting GOIs at risk product contain total numbers and percentage values together with a list of GOIs which are likely to be affected by a hazard. A sample result could look like:

```
{
  "links": {
    "first": "http://esb.heimdall.sp/services/isas/job/c4cbdb5f-b1c9-4c6a-b6f6-66bc1c17d52b/results?page%5Bnumber%5D=1",
    "last": "http://esb.heimdall.sp/services/isas/job/c4cbdb5f-b1c9-4c6a-b6f6-66bc1c17d52b/results?page%5Bnumber%5D=1",
    "next": null,
    "prev": null
  },
  "data": [
    {
      "type": "result",
      "id": "aecfc46c-475e-49b2-b41d-fa368ea70662",
      "attributes": {
        "affected_count": 6,
        "affected_percent": 85.7142857142857,
        "affected_max": 80.0,
        "economic_damage_total": 1930283.035,
        "pop_affected_day_total": 3.76099280862865,
        "pop_affected_night_total": 3.76099280862865,
        "pop_affected_linear_total": 3.763535353334,
        "hazard_max": "high",
        "creationtime": "2019-07-04T19:54:35.103731Z"
      },
      "relationships": {
        "job": {
          "links": {
            "related": "http://esb.heimdall.sp/services/isas/job/c4cbdb5f-b1c9-4c6a-b6f6-66bc1c17d52b"
          }
        }
      }
    }
  ]
}
```

```

},
  "data": {
    "type": "job",
    "id": "c4cbdb5f-b1c9-4c6a-b6f6-66bc1c17d52b"
  }
},
  "aoi": {
    "links": {
      "related": "http://esb.heimdall.sp/services/isas/aoi/444eb2f5-fd56-4eb7-8fd1-915c789d4f93"
    },
    "data": {
      "type": "aoi",
      "id": "444eb2f5-fd56-4eb7-8fd1-915c789d4f93"
    }
  },
  "gois": {
    "meta": {
      "count": 6
    },
    "links": {
      "related":
      "http://esb.heimdall.sp/services/isas/result/aecfc46c-475e-49b2-b41d-fa368ea70662/gois"
    },
    "data": [
      {
        "type": "affected_goi",
        "id": "446cc668-a793-4b6e-8aed-97d1d7ebbbff"
      },
      {
        "type": "affected_goi",
        "id": "527e0e39-8e34-4f11-b455-7dbf8b3af825"
      },
      {
        "type": "affected_goi",
        "id": "f86815de-dec3-41e8-b6fe-ffb0290517ce"
      },
      {
        "type": "affected_goi",
        "id": "f86815de-dec3-41e8-b6fe-ffb0290517ce"
      }
    ]
  }
}

```

```

        "type": "affected_goi",
        "id": "e69e0ee5-d91a-4af9-ba97-b209bbaa69ff"
    },
    {
        "type": "affected_goi",
        "id": "efa63705-7652-4a9b-991f-0b53e1dce5d5"
    },
    {
        "type": "affected_goi",
        "id": "4cd314a2-9aea-4c71-af9f-ec63e0dfa4d4"
    }
]
}
},
"links": {
    "self": "http://esb.heimdall.sp/services/isas/result/aecfc46c-475e-49b2-b41d-fa368ea70662"
}
}
],
"meta": {
    "pagination": {
        "page": 1,
        "pages": 1,
        "count": 1
    }
}
}
}

```

The specified ISA information items provided for AOIs are listed in Table 5-2.

Table 5-2: ISA information attributes for GOIs at risk

Parameter	Short Description	Values	Type
			Usage
Affected GOIs count	Number of GOIs that are considered as affected by ISAS		Integer
			JSON: "attributes.affected_count"

Affected GOIs percent	Number of GOIs that are considered as affected by ISAS divided with the total number of GOIs in the AOI	Percent in the range from 0 to 100	Float JSON: “attributes.affected_percent”
Max. Affected	The maximum impact on a GOI in the AOI	Dependents on the impact assessment product by T6.2	Number
			JSON: “attributes.affected_max”
Economic damage	The sum of economic loss for affected GOIs	Dependents on the impact assessment product by T6.2	Number
			JSON: “attributes.economic_damage_total”
Population (Day time)	The sum of day time population for affected GOIs	Dependents on the exposure product (see D6.1)	Number
			JSON: “attributes.pop_affected_day_total”
Population (Night time)	The sum of night time population for affected GOIs	Dependents on the exposure product (see D6.1)	Number
			JSON: “attributes.pop_affected_night_total”
Population (Linear)	The sum of population for affected GOIs without day and night time de-aggregation	Dependents on the exposure product (see D6.1)	Number
			JSON: “attributes.pop_affected_linear_total”
Max. Hazard Level	Maximum hazard level for this AOI	“low”, “medium”, “high”	Enumeration

			JSON: "attributes.hazard_max"
Creation Time	Start time of the processing	Timestamp	Date
			JSON: "attributes.creationtime"

A basic JSON-based data structure representing an affected GOI looks like the example provided below:

```
{
  "attributes": {
    "function": "Other",
    "goi_type": "buildings",
    "heimdall_id": "1523",
    "location": {
      "coordinates": [
        [
          [
            [
              2.84069454,
              42.39126868
            ],
            [
              2.84065827,
              42.39129673
            ],
            [
              2.8407645,
              42.39137217
            ],
            [
              2.84079141,
              42.39135131
            ],
            [

```

```

        2.84075345,
        42.39132433
    ],
    [
        2.8407627,
        42.39131723
    ],
    [
        2.84069454,
        42.39126868
    ]
]
],
{
    "type": "MultiPolygon"
},
{
    "municipality": "Agullana",
    "name": "Unknown",
    "pop_affected_day": 0.220171387868725,
    "pop_affected_linear": 0.248158781468864,
    "pop_affected_night": 0.0,
    "potential_cascading_effect": false,
    "priority_action_point": "None",
    "physical_damage": 79.63637,
    "response": false,
    "shelter": false
},
{
    "id": "fd1afb39-549a-4b3f-9564-b4f9d02b52e0",
    "links": {
        "self": "http://esb.heimdall.sp/services/isas/affectedgoi/fd1afb39-549a-4b3f-9564-b4f9d02b52e0"
    },
    "relationships": {
        "result": {
            "data": {
                "id": "a09fa746-97ba-42b1-bcf7-9c9bf4b84fda",
                "type": "result"
            }
        }
    }
}

```

```

    "links": {
        "related": "http://esb.heimdall.sp/services/isas/result/a09fa746-97ba-42b1-bcf7-9c9bf4b84fda"
    }
},
"type": "affected_goi"
}

```

5.2.6 Visualization of ISA information in the GUI

While the main part of the ISA results is not suitable for map display, the affected GOIs contain spatial information thus can be allocated on a map. The list of affected GOIs can be displayed in tabular form (see Figure 5-3 for Release C and Figure 5-6 for final release). The summary as described in Chapter 5.2.5 is displayed in a popup (see Figure 5-3 for Release C and Figure 5-4 and Figure 5-5 for final release). The list of affected GOIs for an AOI can be downloaded in CSV format by clicking the respective buttons in the simulation block (see Figure 5-5).

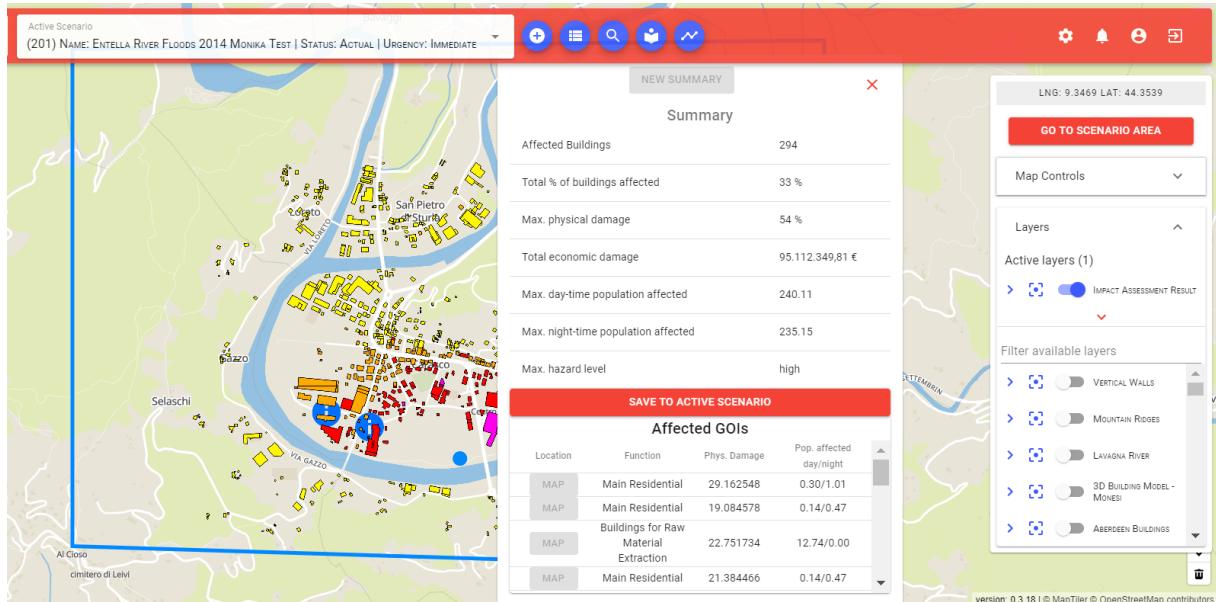


Figure 5-3: Screenshot of the visualization of ISA results in the GUI as it looked in Release C

Impact Summary	
Affected Elements	18
Total % of elements affected	2 %
Max. physical damage	85 %
Total economic damage	9.501.627,95 €
Max. day-time population affected	38.56
Max. night-time population affected	26.51
Max. hazard level	high

Figure 5-4: Impact summary popup in the GUI (final release)

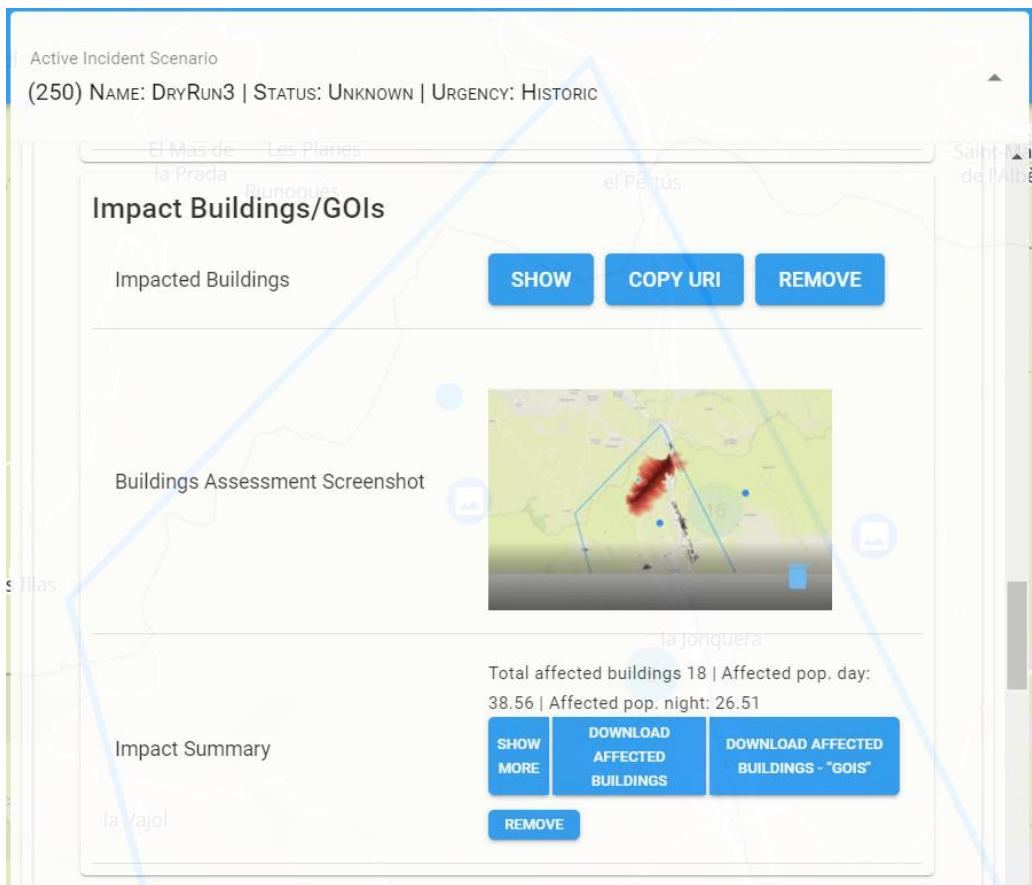


Figure 5-5: Screenshot of the visualization of ISA results in the GUI (final release); The “Impact Summary” block is displayed below the RVA impact assessment (“Impacted Buildings” and “Buildings Assessment Screenshot”) which has been used as input; A subset of total numbers is displayed above the “Show more” button which opens the impact summary popup. The next two buttons allow the user to download the list of affected GOIs in CSV format (first button downloads all affected buildings, second button downloads only the affected vulnerable elements)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	the_geom	goi_type	heimdall_id	name	municipality	function	physical_dama	pop_affected	pop_affected	shelter	response	priority_action	potential_cascading_effect					
2	MULTIPOLYGi buildings		468	Unknown	Agullana	Other	7.963.637	#####	0.0	#####	False	None	False					
3	MULTIPOLYGi buildings		2084	Unknown	Agullana	Other	7.963.637	#####	#####	#####	False	None	False					
4	MULTIPOLYGi buildings		3929	Unknown	Agullana	Other	7.963.637	#####	#####	#####	False	None	False					
5	MULTIPOLYGi buildings		4076	Unknown	la Jonquera	Other	8.229.885	0.690184894	#####	0.9817595223	False	None	False					
6	MULTIPOLYGi buildings		4078	Unknown	la Jonquera	Other	7.963.637	#####	0.0	0.8237776995	False	CI	False					
7	MULTIPOLYGi buildings		4079	Unknown	la Jonquera	Other	7.963.637	0.9058129878	#####	#####	False	None	False					
8	MULTIPOLYGi buildings		4080	Unknown	la Jonquera	Other	80.828.316	#####	0.0	#####	False	None	False					
9	MULTIPOLYGi buildings		4081	Unknown	la Jonquera	Other	8.467.433	0.727244740	#####	#####	False	None	False					
10	MULTIPOLYGi buildings		4085	Unknown	la Jonquera	Other	7.963.637	0.8214456115	#####	#####	False	None	False					
11	MULTIPOLYGi buildings		4087	Unknown	la Jonquera	Other	7.963.637	#####	#####	#####	False	None	False					
12	MULTIPOLYGi buildings		4088	Unknown	la Jonquera	Other	7.963.637	0.271618116	0.696937596	0.3863655592	False	None	False					
13	MULTIPOLYGi buildings		4089	Unknown	la Jonquera	Other	8.467.433	0.6456661975	#####	0.918433514C	False	None	False					
14	MULTIPOLYGi buildings		4090	Unknown	la Jonquera	Other	7.963.637	0.949344675	#####	#####	False	None	False					
15	MULTIPOLYGi buildings		4091	Unknown	la Jonquera	Other	8.150.703	#####	0.0	#####	False	None	False					
16	MULTIPOLYGi buildings		83881	Unknown	Agullana	Other	7.963.637	0.449283485	#####	0.808702054	False	None	False					
17	MULTIPOLYGi buildings		83883	Unknown	Agullana	Other	7.963.637	0.173385085	0.4202214891	0.3120899815	False	None	False					
18	MULTIPOLYGi buildings		89097	Unknown	la Jonquera	Other	7.963.637	#####	0.0	#####	False	None	False					
19	MULTIPOLYGi buildings		89098	Unknown	la Jonquera	Other	7.963.637	#####	0.0	0.7768698511	False	None	False					
20																		
21																		
22																		
23																		

Figure 5-6: Downloaded affected buildings imported into Microsoft Excel

5.2.7 Summary of Functionality

Table 5-3 lists the functionality defined related to jobs. Table 5-4 lists the functionality defined related to ISAS results.

Table 5-3: Functionality related to jobs

ID	Functionality	Interface method	Data exchanged and data representations
ISAS_J_01	Create ISAS generation job	HTTP POST /jobs	Request body: Job resource (JSON) with basic job parameters. Response body: Created job resource
ISAS_J_02	Access job	HTTP GET /jobs/<id>	Request body: nothing Response body: JSON representing the job resource
ISAS_J_03	Delete job	HTTP DELETE /jobs/<id>	Request body: nothing Response body: nothing
ISAS_J_04	Add AOI to job	HTTP POST /jobs/<id>/aois	Request body: AOI resource (JSON). Response body: Created AOI resource
ISAS_J_05	Add config to job	HTTP POST /job/<id>/configuration	Request body: Job configuration resource (JSON). Response body: Created resource
ISAS_J_06	Process job	HTTP POST /jobs/<id>/process	Request body: nothing Response body: Link to the result resource

ISAS_J_07	Access result	HTTP GET /jobs/<id>/results	Request body: nothing Response body: The result resource
-----------	---------------	--------------------------------	---

Table 5-4: Functionality related to results

ID	Functionality	Interface method	Data exchanged and data representations
ISAS_R_01	Access result	HTTP GET /result/<id>/	Request body: nothing Response body: The result resource
ISAS_R_02	Access GOIs	HTTP GET /result/<id>/gois	Request body: nothing Response body: The GOIs for the result (json)
ISAS_R_03	Access GOIs in a tabular format	HTTP GET /result/<id>/affected_gois.csv	Request body: nothing Response body: The GOIs for the result (csv)

5.3 Situation Report Generation Service (SITREP)

The SITREP component provides an interface for system clients to transform all information available for a scenario at a given point of time (scenario snapshot) into a situation report in a standardized message format. The goal is to create means for sharing a COP in a standards-based way in order to foster interoperability between systems. The idea is that a system client (e.g. a mobile app on a field responder's phone) is able to request scenario information from a HEIMDALL system in a different location, e.g. in a control room in a different country. If that client includes a tool to interpret the message protocol and format, it is able to present information included in the message in any desired format, such as text, PDF or a map layer.

The idea of a COP which is shared between system components and human operators has been elaborated and implemented in the PHAROS project and integrated in the PHAROS system as the shared Common Operational Picture (sCOP) extension to the EMSI/A-COP message [9][27]. In the scope of PHAROS an evaluation of existing protocols and formats for emergency information exchange has been performed. For this evaluation interoperability, efficiency and domain coverage have been the major requirements. Both, EMSI/A-COP and the EDXL suite of formats and especially EDXL-SitRep have been assessed to suit these requirements well. At that time, we have decided to opt for the EMSI/A-COP format as the effort for mapping the internal PHAROS situation data model to that format has been estimated to be lower.

In the meantime, we have observed new developments in relevant standardization groups and an increase in the adoption of EDXL standards in European-wide emergency information exchange, in particular for meteorological and hydrological alerts. In addition, the scenario data model elaborated in HEIMDALL extends the PHAROS situation data model by a response planning, long-term view on situational information. Both factors encouraged us to take a closer look at the EDXL suite of emergency messaging standards. An evaluation of the applicability of EDXL to scenario-based response planning has been performed [12]. The work performed in PHAROS has been used as an input. Based on the evaluation results the EDXL-HEIMDALL implementation, based on the EDXL-SitRep message structure, has been elaborated. Figure 5-7 shows a summary of EDXL information concepts identified as useful in the early phase of the project.



Figure 5-7: EDXL-HEIMDALL concepts identified in an early stage of the project

In the meantime, the scenario data model has been continually updated based on the feedback from the end users. Table 5-5, Table 5-6, Table 5-7, Table 5-8, Table 5-9 and Table 5-10 reflect the changes. The main functionality of the SITREP module is the transformation of a HEIMDALL scenario snapshot (JSON format) into an EDXL-based common operational picture. The mentioned tables provide a detailed overview on how this is achieved. Some values are set by the HEIMDALL Catalogue service before the situation report is mapped to Microsoft Word.

If an element of the scenario snapshot has an exact equivalent in the EDXL standard, the corresponding value will be transferred from the JSON data structure into the EDXL data structure. However, not all the elements of a HEIMDALL scenario snapshot have an equivalent in EDXL. Thus, a mapping of values is necessary. The column “Comments” explains how we implemented the mapping.

Table 5-5: EDXL-DE EDXLDistribution element filled with scenario parameters

EDXL Element	SITREP request element	Comments
distributionID		Set by Catalogue

senderID		Set by Catalogue
dateTimeSent		Time the SitRep has been generated/returned by SITREP
dateTimeExpires		Set some time in the future
distributionStatus	sitreprequest.scenario.snapshot.status	“Unknown” - status 0 “Unknown” “Actual” - status 1 “Actual” “Exercise” - status 2 “Training”
distributionKind		“Report”
urgency	sitreprequest.scenario.snapshot.urgency	“Immediate” – urgency 1 “Immediate” “Expected” – urgency 5 “Expected” “Future” – urgency 2 “Future” “Past” – urgency 3 “Historic” “Unknown” – urgency 4 “Fictional” + 6 “Unknown”
severity	sitreprequest.scenario.snapshot.risklevel	“Extreme” – risklevel = “very high” “Severe” – risklevel = “high” “Moderate” – risklevel = “medium” “Minor” – risklevel = “low”/“very low” “Unknown” - risk level null or “Unknown”
certainty	sitreprequest.scenario.snapshot.credibility	“Observed” – Determined to have occurred or to be ongoing “Likely” - Likely (credibility > ~50%) “Possible” - Possible but not likely (credibility <= ~50%) “Unlikely” - Not expected to occur (credibility ~ 0) “Unknown” - credibility unknown
incidentID	sitreprequest.scenario.scenario.id	
incidentDescription	sitreprequest.scenario.scenario.name	
ext:extension		Used for community extensions if necessary, e.g. customized enumerations and very specific scenario-related extensions

Table 5-6: EDXL-SitRep root element filled with scenario parameters

EDXL Element	SITREP request element	Comments
messageID		Set by Catalogue
PreparedBy		Set by Catalogue

IncidentID	sitreprequest.scenario.scenario.id	
actionPlan	sitreprequest.scenario.snapshot.responseplans[0].strategyexplanation	
PreparedBy		Set by Catalogue
urgency	sitreprequest.scenario.snapshot.urgency	“Immediate” – urgency 1 “Immediate” “Expected” – urgency 5 “Expected” “Future” – urgency 2 “Future” “Past” – urgency 3 “Historic” “Unknown” – urgency 4 “Fictional” + 6 “Unknown”
severity	sitreprequest.scenario.snapshot.risklevel	“Extreme” – risklevel = “very high” “Severe” – risklevel = “high” “Moderate” – risklevel = “medium” “Minor” – risklevel = “low”/“very low” “Unknown” - risk level null or “Unknown”
ReportConfidence	sitreprequest.scenario.snapshot.credibility	“Highly Confident” – Determined to have occurred or to be ongoing “Somewhat Confident” - Likely (credibility > ~50%) “Unsure” - Possible but not likely (credibility <= ~50%) “Unknown” - credibility unknown

Table 5-7: EDXL-SitRep Report element type="SituationInformation" mapping

EDXL Element	SITREP request element	Comments
IncidentName	sitreprequest.scenario.scenario.name	
IncidentKind	sitreprequest.scenario.snapshot.hazardtype.category	“Geophysical” – “Landslide” “Meteorological” – “Flood” or “Flash Flood” “Fire” – “Forest Fire”
Ext:Extension	sitreprequest.scenario.snapshot.hazardtype.name	Use extension structure and enter hazardtype.name in ext:value
Example:	<pre> <ext:extension> <ext:community>http://heimdall-h2020.eu/layers/hazard</ext:community> <ext:id>hazardLayer</ext:id> <ext:parameter> <ext:nameURI>http://heimdall- h2020.eu/layers/hazard/subhazardtype</ext:nameURI> </pre>	

<pre> <ext:value>Forest fire: Wind-driven fire in mountainous terrain</ext:value> </ext:parameter> </ext:extension></pre>		
IncidentStartTime	sitrerequest.scenario.snapshot.incidentstarttime	
IncidentLocation	sitrerequest.scenario.snapshot.incidentlocation	
JurisdictionInformation.name		Set by Catalogue

Table 5-8: EDXL-SitRep Report element type="CasualtyAndIllnessSummary" mapping

EDXL Element	SITREP request element	Comments
SummaryCount. nonResponderSummaryCount (where SummaryCount. casualtyAndIllnessCountCategory.countCategory = Fatalities)	sitrerequest.scenario.snapshot.casualties	
SummaryCount. nonResponderSummaryCount (where SummaryCount. casualtyAndIllnessCountCategory.countCategory = WithInjuryOrIllness)	sitrerequest.scenario.snapshot.injured	

Table 5-9: EDXL-SitRep Report element type="ManagementReportingSummary" mapping

EDXL Element	- SITREP request element	Comments
SituationSummary		Root element containing the following elements
SituationSummary.IncidentCause	sitrerequest.scenario.snapshot.source	
Current weather:		
SituationSummary.WeatherEffects	<pre> sitrerequest.scenario. snapshot.conditions(progr=0)[0]: { "accrainfall24h": 2.25, "datetime": "2019-01- 12T07:05:00", "dewpoint": -22.3428, "humidity": 57, "id": 54, "progr": 0, "rainfallfor": 1, "resource_uri": "/heimdall/heimdall_sm_api/condition/5 4/", "scenario": "/heimdall/heimdall_sm_api/scenario/52</pre>	ObservationTime – datetime TempC – temperature DewPointC – dewpoint WindDirDegrees – winddirection WindSpeedkt – windspeed WindGustkt – windgust precip1HrIn – rainfallfor precip24HrIn – accrainfall24h

	<pre> "/", "temperature": 22.334, "verified": false, "winddirection": 260, "windgust": 30, "windspeed": 50 } </pre>	
Current Weather - Humidity:		
Ext:Extension	sitrequest.scenario.snapshot.conditions(progr>0)[0].humidity	Use extension structure and enter humidity in ext:value
Example:		
<pre> <ext:extension> <ext:community>http://heimdall-h2020.eu/layers/weather</ext:community> <ext:id>weatherLayer</ext:id> <ext:parameter> <ext:nameURI>http://heimdall- h2020.eu/layers/weather/current/humidity</ext:nameURI> <ext:value>25</ext:value> </ext:parameter> </ext:extension> </pre>		
Weather Forecast:		
Ext:Extension	siterequest.scenario.snapshot.conditions(progr>0)[0]. <ul style="list-style-type: none"> • datetime • progr • temperature • dewpoint • winddirection • windspeed • windgust • humidity • rainfallfor • accrainfall24 	Use weather extension structure (see above) and enter numbers in ext:value elements: /forecast/observationtime /forecast/forecasthours /forecast/tempc /forecast/dewpointc /forecast/winddirdegrees /forecast/windspeedkt /forecast/windgustkt /forecast/humidity /forecast/precip1hrin /forecast/precip24hrin
Example:		
Add to weatherLayer extension (see above): <pre> <ext:parameter> <ext:nameURI>http://heimdall- h2020.eu/layers/weather/forecast/observationtime</ext:nameURI> <ext:value>2012-07-22T13:30:00</ext:value> </ext:parameter> <ext:nameURI>http://heimdall- h2020.eu/layers/weather/forecast/forecasthours</ext:nameURI> <ext:value>1</ext:value> </ext:parameter> </pre>		

```

<ext:parameter>
  <ext:nameURI>http://heimdall-
h2020.eu/layers/weather/forecast/tempc</ext:nameURI>
    <ext:value>23</ext:value>
  </ext:parameter>
...

```

Simulation total numbers:

Ext:Extension	sitrequest.simulation. sim_flamelength_head sitrequest.simulation. sim_firelineintensity sitrequest.simulation. sim_rateofspread sitrequest.simulation. sim_outofsuppressioncapacity	Use extension structure and enter numbers in ext:value elements
---------------	---	--

Example:

```

<ext:extension>
  <ext:community>http://heimdall-
h2020.eu/layers/simulation</ext:community>
    <ext:id>simulationLayer</ext:id>
    <ext:parameter>
      <ext:nameURI>http://heimdall-
h2020.eu/layers/simulation/flamelength/head</ext:nameURI>
        <ext:value>6.0</ext:value>
      </ext:parameter>
    <ext:parameter>
      <ext:nameURI>http://heimdall-
h2020.eu/layers/simulation/firelineintensity</ext:nameURI>
        <ext:value>1000</ext:value>
      </ext:parameter>
    <ext:parameter>
      <ext:nameURI>http://heimdall-h2020.eu/layers/simulation/
rateofspread</ext:nameURI>
        <ext:value>6.7</ext:value>
      </ext:parameter>
    <ext:parameter>
      <ext:nameURI>http://heimdall-
h2020.eu/layers/simulation/outofsuppressioncapacity</ext:nameURI>
        <ext:value></ext:value>
      </ext:parameter>
    </ext:extension>

```

Impact Summary:

Ext:Extension	sitrequest.simulation. isas_popaffected_total	Use extension structure and enter number in ext:value
---------------	--	---

Example:

```

<ext:extension>
  <ext:community>http://heimdall-h2020.eu/layers/impact</ext:community>
    <ext:id>impactLayer</ext:id>

```

```

<ext:parameter>
  <ext:nameURI>http://heimdall-
h2020.eu/layers/impact/popaffected</ext:nameURI>
  <ext:value>135</ext:value>
</ext:parameter>
</ext:extension>

```

Table 5-10: EDXL-DE ContentObject <OtherContent> mapping

EDXL Element	SITREP request element	Comments
Simulation Result		
ContentObject.otherContent.uri	sitreprequest.simulation.sim_results_uri	URI
EDXL example:		
	<pre> <contentObject xlink:type="resource" xlink:label="contentObject_sim_result"> <contentDescriptor> <contentDescription>Simulation Result</contentDescription> </contentDescriptor> <otherContent> <mimeType>application/json</mimeType> <uri>http://esb.heimdall.sp/services/rest/simulations?simulationId=cdhdraf- 674rhfg-sgu674rgf</uri> </otherContent> </contentObject> </pre>	
Simulation Image		
ContentObject.otherContent.uri	sitreprequest.simulation.sim_image_uri	URI
EDXL example:		
	<pre> <contentObject xlink:type="resource" xlink:label="contentObject_sim_image"> <contentDescriptor> <contentDescription>Simulation Image</contentDescription> </contentDescriptor> <otherContent> <mimeType>image/png</mimeType> <uri>http://esb.heimdall.sp/media/media/scenario_114/44.734Z.png</uri> </otherContent> </contentObject> </pre>	
Impact Assessment / Affected Buildings Image		
ContentObject.otherContent.uri	sitreprequest.simulation.impactbuildings_image_uri	URI

EDXL example:

```
<contentObject xlink:type="resource"  
xlink:label="contentObject_sim_impact_b_image">  
  <contentDescriptor>  
    <contentDescription>Affected Buildings Image</contentDescription>  
  </contentDescriptor>  
  <otherContent>  
    <mimeType>image/png</mimeType>  
  
<uri>http://esb.heimdall.sp/media/media/scenario_114/44.76456Z.png</uri>  
  </otherContent>  
</contentObject>
```

Impact Assessment / Affected Roads Image

ContentObject.otherContent .uri	sitreprequest.simulation. impactroads_image_uri	URI
------------------------------------	--	-----

EDXL example:

```
<contentObject xlink:type="resource"  
xlink:label="contentObject_sim_impact_r_image">  
  <contentDescriptor>  
    <contentDescription>Affected Roads Image</contentDescription>  
  </contentDescriptor>  
  <otherContent>  
    <mimeType>image/png</mimeType>  
  
<uri>http://esb.heimdall.sp/media/media/scenario_114/44.778Z.png</uri>  
  </otherContent>  
</contentObject>
```

Affected Buildings List (tabular format - CSV)

ContentObject.otherContent .uri + .contentData	sitreprequest.simulation. isas_affectedbuildings_csv (.data and .resource_uri)	URI + Data as escaped XML String
---	--	-------------------------------------

EDXL example:

```
<contentObject xlink:type="resource"  
xlink:label="contentObject_sim_affected_b_list">  
  <contentDescriptor>  
    <contentDescription>Affected Buildings List</contentDescription>  
  </contentDescriptor>  
  <otherContent>  
    <mimeType>text/comma-separated-values</mimeType>  
    <uri>http://192.168.127.2/services/isas/result/aecfc46c-475e-49b2-  
b41d-zierz7654783zr/affected_buildings.csv</uri>  
    <contentData>the_geom;function;physical_damage;pop_affected_day;pop_affecte  
d_night
```

```

MULTIPOINT (((7.75338029 44.08053513, 7.75340248 44.08042985, 7.75324971
44.08041306, 7.75322752 44.08051834, 7.75326565 44.08052253, 7.7533444
44.08053123, 7.75338029 44.08053513));Main
Residential;80.0;0.573382136917413;0.573382136917413

MULTIPOINT (((7.75306711 44.08047868, 7.75291754 44.08044644, 7.75287228
44.0805556, 7.75302173 44.08058785, 7.75306711 44.08047868));Main
Residential;80.0;0.619510083517317;0.619510083517317

MULTIPOINT (((7.75326565 44.08052253, 7.75326287 44.08053583, 7.75326847
44.08054858, 7.75328139 44.08055818, 7.75329878 44.08056278, 7.75331729
44.08056127, 7.75333293 44.08055406, 7.75334254 44.08054255, 7.7533444
44.08053123, 7.75326565 44.08052253));Main
Residential;80.0;0.082309235360494;0.082309235360494

MULTIPOINT (((7.75354473 44.08071015, 7.75380831 44.08071951, 7.75381695
44.08059355, 7.75379606 44.080589, 7.75380094 44.08054701, 7.75366722
44.08053889, 7.75366236 44.08058007, 7.7536439 44.08057897, 7.75364086
44.08060496, 7.75355766 44.08059991, 7.75354473 44.08071015));Main
Residential;80.0;1.32714802778383;1.32714802778383

MULTIPOINT (((7.75316422 44.08074921, 7.75310351 44.08073774, 7.75299128
44.08070555, 7.75287935 44.08065895, 7.75284038 44.08070678, 7.75288724
44.08075915, 7.75300448 44.08079068, 7.75302547 44.08081396, 7.75313848
44.0808332, 7.75316422 44.08074921));Main
Residential;80.0;0.918847677635741;0.918847677635741

MULTIPOINT (((7.75334832 44.08076671, 7.7533514 44.08083454, 7.75343912
44.08083252, 7.75343604 44.08076469, 7.75334832 44.08076671));Main
Residential;50.0;0.207496465390677;0.207496465390677

MULTIPOINT (((7.75325049 44.08094724, 7.75325935 44.08085838, 7.75314931
44.08085268, 7.75314045 44.08094153, 7.75325049 44.08094724));Main
Residential;50.0;0.342391058517537;0.342391058517537

MULTIPOINT (((7.75340897 44.0810191, 7.75353707 44.08102122, 7.75353945
44.08094382, 7.75341135 44.0809417, 7.75340897 44.0810191));Main
Residential;50.0;0.345599495783551;0.345599495783551</contentData>
</otherContent>
</contentObject>

```

Affected Roads List (tabular format - CSV)

ContentObject.otherContent .uri + .contentData	sitreprequest.simulation. isas_affectedroads_csv (.data and .resource_uri)	URI + Data as escaped XML String
---	--	-------------------------------------

EDXL example:

```

<contentObject
xlink:type="resource"
xlink:label="contentObject_sim_affected_r_list">
<contentDescriptor>
<contentDescription>Affected Roads List</contentDescription>
</contentDescriptor>
<otherContent>
<mimeType>text/comma-separated-values</mimeType>
<uri>http://192.168.127.2/services/isas/result/aecfc46c-475e-49b2-
b41d-zierz7654783zr/affected_roads.csv</uri>
<contentData>the_geom;...</contentData>
</otherContent>

```

</contentObject>		
Impact Summary		
ContentObject.otherContent .uri	sitreprequest.simulation.isas_results _uri	URI
EDXL example:		
<pre> <contentObject xlink:type="resource" xlink:label="contentObject_sim_isas_result"> <contentDescriptor> <contentDescription>Impact Summary</contentDescription> </contentDescriptor> <otherContent> <mimeType>application/json</mimeType> <uri>http://esb.heimdall.sp/services/isas/job/2b12a8c9-3d00-439d- bbb5-tre6453tgggh/results</uri> </otherContent> </contentObject> </pre>		
Response Plan		
ContentObject.otherContent .uri	sitreprequest.scenario. snapshot.responseplans[0].resource _uri	URI
EDXL example:		
<pre> <contentObject xlink:type="resource" xlink:label="contentObject_responsePlan1"> <contentDescriptor> <contentDescription>Response Plan</contentDescription> </contentDescriptor> <otherContent> <mimeType>application/json</mimeType> <uri>http://esb.heimdall.sp/heimdall_sm_api/responseplan/77/</uri> </otherContent> </contentObject> </pre>		
What-if Simulations		
ContentObject.otherContent .uri + contentData	sitreprequest.whatifsimulations[i]	<p>For each whatifsimulation generate:</p> <ul style="list-style-type: none"> • Simulation Result • Simulation Image • Impact Assessment / Affected Buildings Image • Impact Assessment / Affected Roads Image • Affected Buildings List

		<ul style="list-style-type: none"> • Affected Roads List • Impact Summary
With the following contentObject labels:		
<contentObject contentObject_whatif<i>_result>	xlink:type="resource"	xlink:label="contentObject_label"
<contentObject contentObject_whatif<i>_image>	xlink:type="resource"	xlink:label="contentObject_label"
<contentObject contentObject_whatif<i>_impact_b_image>	xlink:type="resource"	xlink:label="contentObject_label"
<contentObject contentObject_whatif<i>_impact_r_image>	xlink:type="resource"	xlink:label="contentObject_label"
<contentObject contentObject_whatif<i>_affected_b_list>	xlink:type="resource"	xlink:label="contentObject_label"
<contentObject contentObject_whatif<i>_affected_r_list>	xlink:type="resource"	xlink:label="contentObject_label"
<contentObject contentObject_whatif<i>_isas_result>	xlink:type="resource"	xlink:label="contentObject_label"

5.3.1 Workflow

As outlined in section 4.2, a scenario snapshot is used as an input for the situation report generation. Following the RESTful approach, a client (e.g. HEIMDALL SP) requests a scenario snapshot in EDXL-HEIMDALL representation by sending the snapshot via POST to SITREP. This interaction is outlined in Figure 5-8. The functionality is summarized in Table 5-11. Based on the EDXL-HEIMDALL created by SITREP other system components, e.g. the information gateway, are able to generate human readable situation reports in formats like Microsoft Word or PDF.

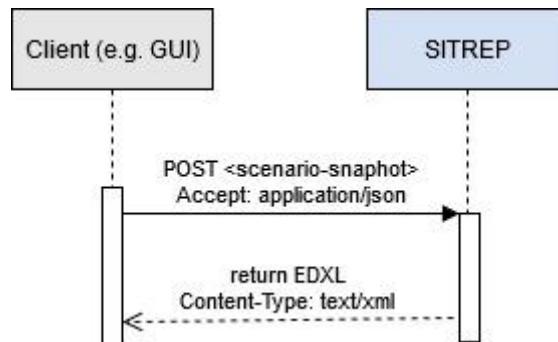


Figure 5-8: Request for the provision of a scenario snapshot in EDXL-HEIMDALL format

Table 5-11: SITREP functionality

ID	Functionality	Interface method	Data exchanged and data representations
SITREP_01	Create EDXL-HEIMDALL out of scenario snapshot and additional values	HTTP POST /services/sitrep	Request body: Scenario snapshot and additional values in JSON format Response body: EDXL-HEIMDALL with the values from the scenario snapshot

5.3.2 REST API

In order to request a scenario snapshot in the XML-based EDXL-HEIMDALL format, an HTTP POST request with the specific scenario snapshot along with optional other values in the request body has to be performed:

```
POST /services/sitrep HTTP/1.1  
Content-Type: application/json
```

With the following body structure:

```
{  
    "scenario": {},  
    "simulation": {  
        "sim_results_uri": "...",  
        "sim_image_uri": "...",  
        "impactbuildings_image_uri": "...",  
        "impactroads_image_uri": "...",  
        "isas_affectedbuildings_json": {  
            "resource_uri": "..."  
        },  
        "isas_affectedroads_json": {  
            "resource_uri": "..."  
        },  
        "isas_results_uri": "...",  
        "isas_popaffected_total": 0  
    },  
    "whatifsimulations": [  
        {  
            "sim_results_uri": "...",  
            "sim_image_uri": "...",  
            "impactbuildings_image_uri": "...",  
            "impactroads_image_uri": "...",  
            "isas_affectedbuildings_json": {  
                "resource_uri": "..."  
            },  
            "isas_affectedroads_json": {  
                "resource_uri": "..."  
            },  
            "isas_results_uri": "...",  
            "isas_popaffected_total": 0  
        }  
    ]  
}
```

```
    }  
]  
}
```

The header of the response looks like that:

```
HTTP/1.1 200 OK  
Content-Type: text/xml
```

The response body contains the values from the JSON transformed into HEIMDALL-EDXL.

Please see Annex A for a complete example of a request with the corresponding response in EDXL-HEIMDALL in Annex B.

6 Implementation Details

The following subsections describe the implementation carried out for the ISAS and SITREP modules, providing a detailed description of the software and hardware used.

6.1 Impact Summary Service (ISAS)

6.1.1 Software Implementation

This subsection describes the software implementation of the ISAS component starting with an overview on the used technologies to a detailed description of the data modelling.

6.1.1.1 Technologies

The implementation language of the ISAS component is the general purpose, high-level language Python. This language focuses on high productivity, code readability and offers a wide variability of supporting software libraries.

The language is built on a dynamic type system and offers automatic memory management which makes it resilient against a wide range of common errors such as buffer overflows or memory leaks.

While the language supports multiple programming paradigms the implementation of this module mostly follows an object-oriented approach with occasional usages of functional elements.

6.1.1.2 Implementation framework and software libraries

The Web API is implemented using the Django framework, an open-source web application framework which follows the Model-View-Controller pattern. The framework includes geographic datatypes and functions following the Simple features specification of the OGC.

In addition to the generic Django framework the “Django REST Framework” is used as a toolkit to implement the REST API.

As mentioned in section 2.1.3 JSON is the preferred format for exchanging data and generating output information.

6.1.1.3 Data storage

The internal data storage is implemented using the database abstraction layer of the Django framework backed by a PostgreSQL database system.

PostgreSQL is object-relational database system with the goal to implement a high standard compliance following the ISO SQL:2011 standard. The system itself can reliably handle high workloads and many concurrent users.

6.1.2 Data Infrastructure

The generation of the database tables to store the data of the ISAS component is handled by the migration system of the Django framework. References described in the model layer of the ISAS component are converted automatically to foreign keys in the database by the migration system. This way the database system guarantees the referential integrity defined in the web application without the need to maintain the database scheme separately from the application itself.

6.1.3 Hardware

The hardware used for the implementation of this module was two virtual machines based on a 64bit Linux distribution. As the first VM is for testing the second VM is for developing. Both

VM's have 4 CPU cores each as well as 1 TB disk memory and 32 GB RAM. A proper Ethernet connection is crucial as well as a connection to the HEIMDALL VPN.

6.2 Situation Report Generation Service (*SITREP*)

6.2.1 Software Implementation

This subsection describes the software implementation of the SITREP component.

6.2.1.1 Technologies

The implementation language of the SITREP component is the general purpose, high-level language Python. This language focuses on high productivity, code readability and offers a wide variability of supporting software libraries.

The language is built on a dynamic type system and offers automatic memory management which makes it resilient against a wide range of common errors such as buffer overflows or memory leaks.

While the language supports multiple programming paradigms the implementation of this module mostly follows an object-oriented approach with occasional usages of functional elements.

6.2.1.2 Implementation framework and software libraries

The Web API is implemented using the Flask framework, a lightweight open source web application framework. Flask was chosen because of its flexibility and the possibility to efficiently create compact and performant web applications.

6.2.2 Hardware

The hardware used for the implementation and operation of this module are two virtual machines based on the 64bit Linux distribution CentOS 7. Both VM's have 4 CPU cores each as well as 1 TB disk memory and 32 GB RAM. A proper Ethernet connection is crucial as well as a connection to the HEIMDALL VPN.

7 Test Plan

This section contains the list of tests designed to verify the successful coverage of the relevant requirements described in section 2. It is important to highlight that the tests documented in this deliverable are the ones for testing the functionalities of ISAS and SITREP system modules individually and that the integration tests are provided in the context of WP 2.

For each technical requirement suitable tests have been described and performed for assessing the fulfilment of each technical requirement. In the first issue of this deliverable, D6.7 [31], tests have been defined and conducted for Release A of the ISAS functionality corresponding to the requirements that have been present at the time of submission of D6.7. This deliverable contains additional test cases corresponding to the updated requirements in section 2 for the final release. The test report is separated into section 7.1 listing the test cases for ISAS and 7.2 for listing the test cases of SITREP. Section 7.3 provides a summary of the test coverage for both modules.

The template used for the documentation of the tests can be found in Table 7-1.

Table 7-1: Test template

Test ID	<i>Unique test identifier in the format “TS_SA_#”</i>
Requirements to be verified	<i>List of technical and system requirements that this test verifies in the form</i> <ul style="list-style-type: none">• TR_SA_#○ Sys_<module>_#
Test objective	<i>Short description of the test objective</i>
Test procedure	<i>Detailed steps to be followed in order to perform the test in the form</i> <ol style="list-style-type: none">1. The user ...2. The user...3. ...
Test prerequisites/configuration	<i>List of pre-requisites which are mandatory to be fulfilled before the test starts; in the form</i> <ul style="list-style-type: none">• ...
Success criteria	<i>List or description of success criteria</i>
Results analysis	<i>Analysis of the test</i>
Success	PASSED / FAILED

7.1 Test Report ISAS

This section contains the list of tests being designed to verify the successful coverage of the relevant requirements described in section 2.

Table 7-2: TS_SA_1

Test ID	TS_SA_1
Requirements to be verified	<ul style="list-style-type: none">• TR_SA_1<ul style="list-style-type: none">○ Sys_SADS_1• TR_SA_18<ul style="list-style-type: none">○ Sys_SADS_1

	<ul style="list-style-type: none"> ○ Sys_SADS_20 • TR_SA_21 <ul style="list-style-type: none"> ○ Sys_SADS_1 ○ Sys_SADS_18
Test objective	Verify that the ISAS generates and provides for an AOI or the area of scenario an impact summary in the form of a list of potentially affected geographic elements (GOIs) available in the system (provided through the exposure layers) together with impact summary (ISA) information for each of these elements, in particular the degree of physical damage and the number of affected people. The operation can be performed by directly using the REST API.
Test procedure	<ol style="list-style-type: none"> 1. The user opens a REST Client. 2. The user sends a POST request to the /isas/job/ end point with a job resource which contains a reference to the buildings exposure layer and the RVA result. 3. The user sends a POST request to the /isas/job/<generated-id>/aois end point with the specification of the respective AOI polygon 4. The user sends a PROCESS request to start the ISA generation process. 5. Once the PROCESS response arrives the user sends a GET request for the resulting GOIs. The URI is linked in the result resource which is linked in the job resource (/isas/result/<id>/gois by convention). 6. The user inspects the resulting list of GOIs for a set value in each affected GOI's "physical_damage" and "pop_affected_linear" elements.
Test prerequisites/configuration	<ul style="list-style-type: none"> • The tester must have HTTP access to the VM on which the ISAS is hosted. • The tester should use a REST Client for sending requests to ISAS • The tester should provide an AOI which intersects the provided RVA results
Success criteria	The user can see set "physical_damage" and "pop_affected_linear" values in each of the affected GOIs.
Results analysis	<i>The test has been performed and passed displaying a list of GOIs, some with "physical_damage" value greater than 0. The affected GOIs correspond with those intersecting the fire perimeters of the underlying simulation used for the generation of the RVA results which have been referenced in the ISAS when both are displayed on a map.</i>
Success	PASSED

Table 7-3: TS_SA_2

Test ID	TS_SA_2
Requirements to be verified	<ul style="list-style-type: none"> • TR_SA_2 <ul style="list-style-type: none"> ○ Sys_SADS_1 ○ Sys_SADS_18
Test objective	Verify that the ISAS generates and provides for an AOI or the area of scenario ISA information in the form of the total number of people at risk in an AOI. The operation can be performed by directly using the REST API.
Test procedure	<ol style="list-style-type: none"> 1. The user opens a REST Client. 2. The user sends a POST request to the /isas/job/ end point with a job resource which contains a reference to a buildings exposure layer and a RVA result.

	<ol style="list-style-type: none"> 3. The user sends a POST request to the /isas/job/<generated-id>/aois end point with the specification of the respective AOI polygon 4. The user sends a PROCESS request to start the ISA generation process. 5. Once the PROCESS response arrives the user sends a GET request for the impact summary result using the respective reference in the job resource (/isas/job/<id>/result by convention). 6. The user inspects the people-related attributes in the result and verifies that they contain a number: "pop_affected_day_total", "pop_affected_night_total", "pop_affected_linear_total"
Test prerequisites/configuration	<ul style="list-style-type: none"> • The tester must have HTTP access to the VM on which the ISAS is hosted. • The tester should use a REST Client for sending requests to ISAS • The tester should provide an AOI which intersects the provided RVA results
Success criteria	The user can see set "pop_affected_day_total", "pop_affected_night_total", "pop_affected_linear_total" values in the ISAS result resource.
Results analysis	<i>The test has been performed and passed displaying an impact summary result with "pop_affected_day_total", "pop_affected_night_total", "pop_affected_linear_total" value greater than 0.</i>
Success	PASSED

Table 7-4: TS_SA_3

Test ID	TS_SA_3
Requirements to be verified	<ul style="list-style-type: none"> • TR_SA_3 <ul style="list-style-type: none"> ◦ Sys_SADS_13 • TR_SA_4 <ul style="list-style-type: none"> ◦ Sys_SADS_13 • TR_SA_10 <ul style="list-style-type: none"> ◦ Sys_SADS_13
Test objective	Verify that thresholds for the automatic generation of ISA information for a) GOIs at risk, b) people at risk and c) cascading effects can be configured and modified through configuration information added to a job resource. Configuration changes shall be visible in ISAS process results. The operation can be performed by directly using the REST API.
Test procedure	<ol style="list-style-type: none"> 1. The user opens a REST Client. 2. The user sends a POST request to the /isas/job/ end point with a job resource which contains a reference to the buildings exposure layer and the RVA result. 3. The user sends a POST request to the /isas/job/<id>/configuration end point with a body which contains the specification of configuration attributes. These shall be compliant with the used exposure dataset and RVA result, e.g. <ul style="list-style-type: none"> ◦ "hazard_field_name": "forcing_29" ◦ "hazard_max_threshold": 3.0 ◦ "hazard_medium_threshold": 2.0 ◦ "hazard_min_threshold": 1.0, ◦ "economic_damage_field_name": "indicator_80"

	<ul style="list-style-type: none"> ○ "goi_type":"buildings", <p>4. The user sends a PROCESS request to start the ISA generation process.</p> <p>5. Once the PROCESS response arrives the user sends a GET request for the ISAS result using the respective reference in the job resource (/isas/job/<id>/result by convention).</p> <p>6. The user inspects the resulting impact summary and list of GOIs whether the configuration is reflected, e.g. the max. hazard level in the AOI corresponds to the RVA assessment at building level and only buildings have been assessed.</p>
Test prerequisites/configuration	<ul style="list-style-type: none"> • The tester must have HTTP access to the VM on which the ISAS is hosted. • The tester should use a REST Client for sending requests to ISAS • The tester should use fitting exposure data, RVA results and configuration criteria
Success criteria	The user can see configuration-specific results in the main impact summary part and at GOI level.
Results analysis	-
Success	PASSED

Table 7-5: TS_SA_4

Test ID	TS_SA_4
Requirements to be verified	<ul style="list-style-type: none"> • TR_SA_3 <ul style="list-style-type: none"> ○ Sys_SADS_13 • TR_SA_4 <ul style="list-style-type: none"> ○ Sys_SADS_13 • TR_SA_10 <ul style="list-style-type: none"> ○ Sys_SADS_13 • TR_SA_8 <ul style="list-style-type: none"> ○ Sys_SADS_27 • TR_SA_19 <ul style="list-style-type: none"> ○ Sys_SADS_21 • TR_SA_20 <ul style="list-style-type: none"> ○ Sys_SADS_22
Test objective	<p>Verify that ISAS results can be filtered by specifying rules in the “filter” query parameter of the GET request for the result and sorted by specifying one or more “sort” query parameters. The operation can be performed by directly using the REST API.</p> <p>Verify that ISAS generates and provides for an AOI or the area of scenario an impact summary in the form of a list of potential cascading effects/hazards.</p>
Test procedure	<ol style="list-style-type: none"> 1. The user opens a REST Client. 2. The user sends a GET request for the available GOIs list containing only GOIs <ul style="list-style-type: none"> ○ with a physical damage greater than 50 % (/isas/result/<id>/gois?filter=physical_damage >= 50&sort=-pop_affected_day) ○ with affected population number greater than 5 (/isas/result/<id>/gois?filter= pop_affected_linear >= 5)

	<ul style="list-style-type: none"> ○ which are potential sources for cascading effects (/isas/result/<id>/gois?filter=potential_cascading_effect=true) <p>3. The user inspects the resulting list of GOIs which should correspond to the set filters</p> <p>4. The user sends a GET request for the ISAS main result resource and accesses the attribute value of "pop_affected_linear_total" using the JSON dot (.) notation in the REST Client (result.data.attributes.pop_affected_linear_total)</p>
Test prerequisites/configuration	<ul style="list-style-type: none"> • The tester must have HTTP access to the VM on which the ISAS is hosted. • The tester should use a REST Client for sending requests to ISAS • GOIs at risk should include items with the requested values
Success criteria	The user can see only GOIs which correspond to the set filters and the total number of affected people.
Results analysis	-
Success	PASSED

Table 7-6: TS_SA_5

Test ID	TS_SA_5
Requirements to be verified	<ul style="list-style-type: none"> • TR_SA_6 <ul style="list-style-type: none"> ○ Sys_SADS_2
Test objective	Verify that ISAS generates and provides ISA information for a given list of GOIs.
Test procedure	<p>1. Perform the same steps as in TS_SA_1 but provide a customized exposure dataset which contains only the selected GOIs</p>
Test prerequisites/configuration	<ul style="list-style-type: none"> • The tester must have HTTP access to the VM on which the ISAS is hosted. • The tester should use a REST Client for sending requests to ISAS • The tester should provide an AOI which intersects the provided RVA results
Success criteria	The user can see in the result the given GOIs only
Results analysis	-
Success	PASSED

Table 7-7: TS_SA_6

Test ID	TS_SA_6
Requirements to be verified	<ul style="list-style-type: none"> • TR_SA_7 <ul style="list-style-type: none"> ○ Sys_SADS_6 • TR_SA_12 <ul style="list-style-type: none"> ○ Sys_SADS_6 • TR_SA_22 <ul style="list-style-type: none"> ○ Sys_SADS_25 • TR_SA_23 <ul style="list-style-type: none"> ○ Sys_SADS_26
Test objective	Verify that ISAS provides means for modifying the ISA information generated for

	<p>each of the potentially affected GOIs in the returned list.</p> <p>Verify that ISAS provides means for modifying the ISA information on total number of people at risk.</p> <p>Verify that ISAS provides the list of affected GOIs in tabular (CSV) format</p> <p>Verify that the list of affected GOIs in tabular format can be filtered according to a specific building type.</p>
Test procedure	<ol style="list-style-type: none"> Having generated an ISAS result the user sends a GET request to receive the list of affected GOIs in tabular CSV format (/result/<id>/affected_gois.csv) The user modifies the list e.g. in Microsoft Excel as requested by the end user partners The user modifies the numbers of affected people (day, night, linear) in the list which causes an update of total numbers in the CSV The user filters the CSV table according to a specific function extracted from the exposure dataset
Test prerequisites/configuration	<ul style="list-style-type: none"> The tester must have HTTP access to the VM on which the ISAS is hosted. The tester should use a REST Client for sending requests to ISAS
Success criteria	The user has successfully downloaded GOIs in CSV format, imported them in Microsoft Excel and modified and sorted GOIs, their attributes and numbers of affected people
Results analysis	-
Success	PASSED

Table 7-8: TS_SA_7

Test ID	TS_SA_7
Requirements to be verified	<ul style="list-style-type: none"> • TR_SA_16 <ul style="list-style-type: none"> ◦ Sys_SADS_1 ◦ Sys_SADS_19 • TR_SA_17 <ul style="list-style-type: none"> ◦ Sys_SADS_1 ◦ Sys_SADS_20
Test objective	Verify that the ISAS generates and provides for an AOI or the area of scenario ISA information in the form of a) the total economic damage and b) total percentage of potentially damaged GOIs in an AOI. The operation can be performed by directly using the REST API.
Test procedure	<ol style="list-style-type: none"> 1. The user performs steps 1-5 of TS_SA_2 2. The user inspects the attribute "economic_damage_total" in the result 3. The user inspects the attribute "affected_percent" in the result
Test prerequisites/configuration	<ul style="list-style-type: none"> The tester must have HTTP access to the VM on which the ISAS is hosted. The tester should use a REST Client for sending requests to ISAS The tester should provide an AOI which intersects the provided RVA results
Success criteria	The user can see a set value in the "economic_damage_total" and "affected_percent" attributes of the ISAS result resource.

Results analysis	<i>The test has been performed and passed displaying an impact summary result with "economic_damage_total" and "affected_percent" values greater than 0.</i>
Success	PASSED

7.2 Test Report SITREP

Table 7-9: TS_SA_8

Test ID	TS_SA_8
Requirements to be verified	<ul style="list-style-type: none"> • TR_SA_5 ◦ Sys_SADS_16
Test objective	Verify that the SITREP transforms scenario information and associated information such as ISA information in descriptive form (XML).The operation can be performed by directly using the REST API.
Test procedure	<ol style="list-style-type: none"> 1. The user sends a POST request to SITREP with the scenario and associated information in the request body 2. The user inspects that the scenario and associated information are available in the generated EDXL-SitRep document
Test prerequisites/ configuration	<ul style="list-style-type: none"> • The tester must have HTTP access to the VM on which the SITREP is hosted. • The tester should use a REST Client for sending requests to SITREP
Success criteria	The user receives an EDXL-SitRep document with the XML-representation of the scenario representation. The EDXL-SitRep is valid.
Results analysis	-
Success	PASSED

7.3 Test Summary

The matrix in Table 7-10 summarizes the test coverage of technical requirements.

Table 7-10: Test coverage matrix

Requirement ID	Test ID	Result
TR_SA_1	TS_SA_1	PASSED
TR_SA_2	TS_SA_2	PASSED PASSED
TR_SA_3	TS_SA_3 TS_SA_4	PASSED
TR_SA_4	TS_SA_4	PASSED
TR_SA_5	TS_SA_8	PASSED
TR_SA_6	TS_SA_5	PASSED
TR_SA_7	TS_SA_6	PASSED
TR_SA_8	TS_SA_4	PASSED
TR_SA_10	TS_SA_3	PASSED

	TS_SA_4	
TR_SA_12	TS_SA_6	PASSED
TR_SA_16	TS_SA_7	PASSED
TR_SA_17	TS_SA_7	PASSED
TR_SA_18	TS_SA_1	PASSED
TR_SA_19	TS_SA_4	PASSED
TR_SA_20	TS_SA_4	PASSED
TR_SA_21	TS_SA_1	PASSED
TR_SA_22	TS_SA_6	PASSED
TR_SA_23	TS_SA_6	PASSED

8 Conclusion

This document provided an overview of work conducted in task 6.3 in close collaboration with the other tasks in WP6, with the end user and ELSI partners in the project consortium. In the first part aspects of situation awareness, situation assessment and decision support in strategic response planning and the implementation of the concepts in HEIMDALL have been highlighted.

The second part of the document provided the detailed design and technical specification of the ISAS and SITREP components. The working versions of the specifications have been maintained and updated continuously in the HEIMDALL Wiki. On the basis of the design the involved technical partners have been able to develop the releases of the components. The final versions in the wiki have been transferred to this deliverable.

Requirements and solutions evolve through collaborative design and the HEIMDALL agile system development considers the needs of end users and other stakeholders. Intermediary system releases based on the case studies developed by the end users have been demonstrated in real-environment conditions, for example during EUW4 in October 2019. These demonstrations and exercises have given the end users the possibility to reflect on intermediary solutions, to validate these and to identify problems and further needs. User feedback has been acquired during demonstrations and exercises. This information has led to re-iterations of technical requirements and the component design. Furthermore, in in-depth discussions, the ISAS data model and situation report contents have been refined. This document reflects the design updates made since the draft version of this document (D6.7 in M18).

As a matter of prioritization, the system development could not include all evolving user requirements and concepts. A cost-neutral extension of the project lifetime will enable us to take on these requirements. Not in the form of full-fledged functionalities but in the form of concepts for future research and development and experimental proof-in-concept implementations, fine-tuning of expert criteria and methods. We believe that some of these activities will improve the HEIMDALL modules to be verified in a final demonstration. We plan to promote these current developments and to document them in the additional deliverable D6.19 Situation Assessment, Decision Support and Scenario Matching – Updated Concepts at the end of the project.

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Annex A: SITREP example request body

```
{  
    "scenario": {  
        "landscape": {  
            "area": {  
                "coordinates": [  
                    [  
                        [  
                            [3.381857167647456,  
                             42.50908204833727  
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                                             42.50908204833727  
                                            ]  
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                                    ],  
                                ],  
                            ]  
                        ]  
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    ]  
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    "images": [],  
    "name": "Strong wind_Tramuntana_20120717",  
    "relationships": [],  
    "resource_uri": "/services/sm/landscapescenario/5/",  
    "scenarios": [  
}
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"/services/sm/scenario/214/"

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"synopticsituation": {
    "explanation": "Strong wind",
    "id": 1,
    "resource_uri": "/services/sm/scenariosynopticsituation/1/",
    "situation": {
        "id": 1,
        "name": "Strong wind",
        "resource_uri": "/services/sm/synopticsituation/1/"
    }
},
"synopticsituationassessment": "Tramuntana wind (North wind)
episode"
},
"scenario": {
    "id": 214,
    "name": "LaJonquera_FF_20120722",
    "resource_uri": "/services/sm/scenariomatchingquery/214/"
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"snapshot": {
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                    2.885207899563028,
                    42.442086555177184
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                [
                    2.8888223691674284,
                    42.42462521330404
                ],
                [
                    2.8477488509802527,

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        42.419046259417115
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"type": "Polygon"
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"automatic": false,
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"challenge": {
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    "name": "Multi-agency / multi leadership environment",
    "resource_uri": "/services/sm/challenge/3/"
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"challengecapabilities": [
{
    "capability": {
        "id": 1,
        "name": "Incident Command Organization",
        "resource_uri": "/services/sm/lessoncapability/1/"
    },
    "ccc": "Distribute decision-making",
    "challenge": {
        "id": 3,
        "name": "Multi-agency / multi leadership environment",
        "resource_uri": "/services/sm/challenge/3/"
    },
    "description": [
    {
        "challengecapability":
"/services/sm/challengecapability/16/",
            "description": "Identify roles and capabilities from different agencies and stakeholders in the emergency.",
            "resource_uri":
"/services/sm/challengecapabilitydescription/1/"
    }
]
}
]
}

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        },
        {
            "challengecapability":
"/services/sm/challengecapability/16/",

                "description": "Build a shared understanding concerning scenario and strategy across responders to synchronize simultaneous decision-making. Manage complex information focusing on the multiple levels of decision-making.",

                    "resource_uri":
"/services/sm/challengecapabilitydescription/2/"

        },
        {
            "challengecapability":
"/services/sm/challengecapability/16/",

                "description": "Management by objectives, giving flexibility and autonomy in decision making. Lower decision making. Distributed decision-making based on assigned missions, on common objectives and a shared understanding on situation.",

                    "resource_uri":
"/services/sm/challengecapabilitydescription/3/"

        },
        {
            "challengecapability":
"/services/sm/challengecapability/16/",

                "description": "Identify points of coordination in the different zones: from local (hot zone, warm zone ...) to regional to national. Establish different levels of liaison officers, translators, communication and infrastructures as needed.",

                    "resource_uri":
"/services/sm/challengecapabilitydescription/4/"

        }
    ],
    "id": 16,
    "resource_uri": "/services/sm/challengecapability/16/"

},
{
    "capability": {
        "id": 2,
        "name": "Pre-planning",
        "resource_uri": "/services/sm/lessoncapability/2/"

    },
    "ccc": "Pre-plan interoperability and enhance synergies",

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"challenge": {
    "id": 3,
    "name": "Multi-agency / multi leadership environment",
    "resource_uri": "/services/sm/challenge/3/"
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"description": [
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"/services/sm/challengecapability/17/",
        "description": "Agreed chain of command, specifying roles and capabilities in advanced.",
        "resource_uri":
"/services/sm/challengecapabilitydescription/5/"
},
{
    "challengecapability":
"/services/sm/challengecapability/17/",
        "description": "Pre-plan should be known by all agencies and stakeholders",
        "resource_uri":
"/services/sm/challengecapabilitydescription/6/"
},
{
    "challengecapability":
"/services/sm/challengecapability/17/",
        "description": "Legal framework for cross-border help,, emergency support, victim transportation, recognition of qualifications, ...",
        "resource_uri":
"/services/sm/challengecapabilitydescription/7/"
},
{
    "challengecapability":
"/services/sm/challengecapability/17/",
        "description": "Enhance synergies between experts and agencies at regional, national and international level. Share specialists and experts.",
        "resource_uri":
"/services/sm/challengecapabilitydescription/8/"
},
{

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                "challengecapability":
"/services/sm/challengecapability/17/" ,
                    "description": "Emergency preparedness should be
dealt with international / European perspectives.",
                    "resource_uri":
"/services/sm/challengecapabilitydescription/9/"
            },
            {
                "challengecapability":
"/services/sm/challengecapability/17/" ,
                    "description": "European interagency round tables
for lessons learned processes and the generation of new standards.",
                    "resource_uri":
"/services/sm/challengecapabilitydescription/10/"
            }
        ],
        "id": 17,
        "resource_uri": "/services/sm/challengecapability/17/"

    },
    {
        "capability": {
            "id": 3,
            "name": "Standardization",
            "resource_uri": "/services/sm/lessoncapability/3/"

        },
        "ccc": "Establish an interagency framework",
        "challenge": {
            "id": 3,
            "name": "Multi-agency / multi leadership environment",
            "resource_uri": "/services/sm/challenge/3/"

        },
        "description": [
            {
                "challengecapability":
"/services/sm/challengecapability/18/" ,
                    "description": "Establish standards of roles,
capabilities, competencies and processes for a multi-agency framework, and
the mechanisms to certify them. Nowadays under similar names there are
different capabilities, competencies and processes.",
                    "resource_uri":
"/services/sm/challengecapabilitydescription/81/"

            }
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}

```

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        },
        {
            "challengecapability":
"/services/sm/challengecapability/18/",

                "description": "Integrate specialist and non-specialist in operations, in the command post and in the chain of command",
                "resource_uri":
"/services/sm/challengecapabilitydescription/82/"

        },
        {
            "challengecapability":
"/services/sm/challengecapability/18/",

                "description": "Regulate cross-border plans and aids, and jurisdiction responsibilities. Mandatory unified communication system at least in cross-border scenarios.",
                "resource_uri":
"/services/sm/challengecapabilitydescription/83/"

        },
        {
            "challengecapability":
"/services/sm/challengecapability/18/",

                "description": "Standardize fluxes of information and decision-making between private, civil and military environments, reducing bureaucracy.",
                "resource_uri":
"/services/sm/challengecapabilitydescription/84/"

        }
    ],
    "id": 18,
    "resource_uri": "/services/sm/challengecapability/18/"

},
{
    "capability": {
        "id": 4,
        "name": "Knowledge cycle",
        "resource_uri": "/services/sm/lessoncapability/4/"

    },
    "ccc": "Build a shared understanding of emergency and train interagency scenarios",
    "challenge": {
        "id": 3,

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        "name": "Multi-agency / multi leadership environment",
        "resource_uri": "/services/sm/challenge/3/"
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    "description": [
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            "challengecapability":
"/services/sm/challengecapability/19/",

                "description": "Provide a shared understanding of
the emergency behaviour, roles, terminology, capabilities, decision-making
and other specific processes, before, during and after the emergency to all
involved. Liaison officers as 'translators' (language, cultures, ...) in
different decision levels.",
                "resource_uri":
"/services/sm/challengecapabilitydescription/85/"

            },
            {
                "challengecapability":
"/services/sm/challengecapability/19/",

                    "description": "Standardize competences for
specific positions at European Level, and its certification processes.",

                    "resource_uri":
"/services/sm/challengecapabilitydescription/86/"

                },
                {
                    "challengecapability":
"/services/sm/challengecapability/19/",

                        "description": "Once the standard roles of
different actors have been trained and drilled, organize joint exercises
where the focus is on decision-making, coordination and interactions
between agents. Train on overlapped competences, and limits of
competences.",

                        "resource_uri":
"/services/sm/challengecapabilitydescription/87/"

                    },
                    {
                        "challengecapability":
"/services/sm/challengecapability/19/",

                            "description": "Train values such as empathy,
adaptability, proactivity, collaboration and leadership, and promote trust
building.",

                            "resource_uri":
"/services/sm/challengecapabilitydescription/88/"

                    },
                    {

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                "challengecapability":
"/services/sm/challengecapability/19/" ,
                    "description": "Map existing networks and stakeholders at national, regional and local level.",
                    "resource_uri":
"/services/sm/challengecapabilitydescription/89/"
            },
            {
                "challengecapability":
"/services/sm/challengecapability/19/" ,
                    "description": "Engage network of experts on in-site based activities.",
                    "resource_uri":
"/services/sm/challengecapabilitydescription/90/"
            }
        ],
        "id": 19,
        "resource_uri": "/services/sm/challengecapability/19/"
    },
    {
        "capability": {
            "id": 5,
            "name": "Information management",
            "resource_uri": "/services/sm/lessoncapability/5/"
        },
        "ccc": "Define common information management processes between agencies",
        "challenge": {
            "id": 3,
            "name": "Multi-agency / multi leadership environment",
            "resource_uri": "/services/sm/challenge/3/"
        },
        "description": [
            {
                "challengecapability":
"/services/sm/challengecapability/20/" ,
                    "description": "Define the information to be shared among agencies, and share a database (cartography, plans, lessons learned ...). Share needs and limitations from different agencies",
                    "resource_uri":
"/services/sm/challengecapabilitydescription/91/"
            }
        ]
    }
}
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        },
        {
            "challengecapability":
"/services/sm/challengecapability/20/",
                "description": "Define the evaluation process and
each agency paper on it.",
                "resource_uri":
"/services/sm/challengecapabilitydescription/92/"
            },
            {
                "challengecapability":
"/services/sm/challengecapability/20/",
                "description": "Relevant procedures and terminology
should be known by all responders.",
                "resource_uri":
"/services/sm/challengecapabilitydescription/93/"
            },
            {
                "challengecapability":
"/services/sm/challengecapability/20/",
                "description": "Standardize the shared information
between the Call Center and the Command Post.",
                "resource_uri":
"/services/sm/challengecapabilitydescription/94/"
            }
        ],
        "id": 20,
        "resource_uri": "/services/sm/challengecapability/20/"
    },
    {
        "capability": {
            "id": 6,
            "name": "Community involvement",
            "resource_uri": "/services/sm/lessoncapability/6/"
        },
        "ccc": "Not identified at this stage",
        "challenge": {
            "id": 3,
            "name": "Multi-agency / multi leadership environment",
            "resource_uri": "/services/sm/challenge/3/"
        },
        "id": 20
    }
}

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        "resource_uri": "/services/sm/challenecapability/21/"
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    {
        "capability": {
            "id": 7,
            "name": "Technology",
            "resource_uri": "/services/sm/lessoncapability/7/"
        },
        "ccc": "Technological tools to support data sharing",
        "challenge": {
            "id": 3,
            "name": "Multi-agency / multi leadership environment",
            "resource_uri": "/services/sm/challenge/3/"
        },
        "description": [],
        "id": 22,
        "resource_uri": "/services/sm/challenecapability/22/"
    }
],
"conditions": [
    {
        "accrainfall24h": null,
        "datetim": "2020-02-11T09:23:00",
        "dewpoint": 18.87,
        "humidity": 43.0,
        "id": 148,
        "progr": 0,
        "rainfallfor": 0.0,
        "rainfallintensity": null,
        "resource_uri": "/services/sm/condition/148/",
        "snapshots": [
            "/services/sm/scenariosnapshot/31/"
        ],
        "temperature": 33.07,
        "verified": true,
        "winddirection": 102.0,
    }
]

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],
"creationtime": "2020-01-22T11:31:07.474638",
"credibility": null,
"crossborderincident": true,
"decisions": [],
"documents": [
{
    "description": "La Jonquera Sim Image",
    "file": "/services/smmedia/2/2/2/2/2/2/2/2/2/docs/La-Jonquera-sim-image-for-sitrep.png",
    "id": 121,
    "resource_uri": "/services/sm/document/121/"
},
],
"firebehaviour": {
    "distancetosecondaryfocus_massive": 400.0,
    "distancetosecondaryfocus_puntualmax": 1000.0,
    "firepropagationtype": {
        "id": 5,
        "name": "Sustained torching",
        "resource_uri": "/services/sm/firepropagationtype/5/"
    },
    "firetype": {
        "id": 5,
        "name": "Wind-driven fires in mountainous terrain",
        "resource_uri": "/services/sm/firetype/5/"
    },
    "id": 2,
    "meanflamelen_flank": 6.0,
    "meanflamelen_head": 10.0,
    "meanflamelen_max": 20.0,
    "observations": "High intensity surface fire and torching at wildland-urban interface; open fire head that generates massive spot fires that spread over a territory with a forest mosaic, agricultural areas, infrastructure and vulnerable elements",
    "propagationvelocity_max": 7.7,
}
]
}
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    "propagationvelocity_mean": 1.68,
    "registrationnumber": "",
    "resource_uri": "/services/sm/firebehaviour/2/"

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"floodbehaviour": null,
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    "category": {
        "id": 1,
        "name": "Forest fire",
        "resource_uri": "/services/sm/hazardcategory/1/"
    },
    "id": 5,
    "name": "Forest fire: Wind-driven fire in level terrain",
    "resource_uri": "/services/sm/hazardtype/5/"

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"id": 31,
"images": [],
"incidentendtime": "2012-07-30T07:56:00",
"incidentlocation": {
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        2.863737287155459,
        42.4334247596843
    ],
    "type": "Point"
},
"incidentplacename": "Parking of Pertús",
"incidentstarttime": "2012-07-22T12:54:32.527314",
"incidenttime": "2020-01-22T11:31:07.469124",
"injured": 0,
"lessonslearnt": [
{
    "capability": {
        "id": 6,
        "name": "Community involvement",
        "resource_uri": "/services/sm/lessoncapability/6/"

},
    "document": null,
    "evaluation": {

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        "resource_uri": "/services/sm/lessonevaluation/1/"

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    "id": 125,
    "lesson": "This is a test lesson",
    "level": {
        "alias": null,
        "description": null,
        "id": 5,
        "name": "Division (Supervisor)",
        "resource_uri": "/services/sm/levelofcommand/5/"

    },
    "resource_uri": "/services/sm/lessonlearnt/125/",
    "snapshots": [
        "/services/sm/scenariosnapshot/31/"

    ],
    "time": "2020-02-11T15:09:00"

}
],
"measures": [],
"relationships": [
{
    "description": "",
    "id": 347,
    "resource_uri": "/services/sm/relationship/347/",
    "snapshots": [
        "/services/sm/scenariosnapshot/31/"

    ],
    "type": {
        "id": 5,
        "name": "Simulation",
        "resource_uri": "/services/sm/relationshiptype/5/"

    },
    "uri": ""

},
{
    "description": "fire sim 1",

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        "snapshots": [
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        "type": {
            "id": 5,
            "name": "Simulation",
            "resource_uri": "/services/sm/relationships/type/5/"
        },
        "uri":
"http://esb2.heimdall.sp/services/rest/simulations?simulationId=8ed2e2f9-
d2c4-46da-b4ff-08645bd2f448"
    },
    {
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        "id": 343,
        "resource_uri": "/services/sm/relationship/343/",
        "snapshots": [
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        ],
        "type": {
            "id": 5,
            "name": "Simulation",
            "resource_uri": "/services/sm/relationships/type/5/"
        },
        "uri":
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2b6c-4bb4-ae3e-7365587b610f"
    },
    {
        "description": "tyeset",
        "id": 344,
        "resource_uri": "/services/sm/relationship/344/",
        "snapshots": [
            "/services/sm/scenariosnapshot/31/"
        ],
        "type": {
            "id": 5,

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        "name": "Simulation",
        "resource_uri": "/services/sm/relationshiptype/5/"
    },
    "uri":
"http://esb2.heimdall.sp/services/rest/floodsimulations?id=33"
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{
    "description": "testlatest",
    "id": 345,
    "resource_uri": "/services/sm/relationship/345/",
    "snapshots": [
        "/services/sm/scenariosnapshot/31/"
    ],
    "type": {
        "id": 5,
        "name": "Simulation",
        "resource_uri": "/services/sm/relationshiptype/5/"
    },
    "uri":
"http://esb2.heimdall.sp/services/rest/floodsimulations?id=34"
}
],
"representative": true,
"resource_uri": "/services/sm/scenariosnapshot/31/",
"responseplans": [
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    "agencies": 0,
    "challenge": {
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        "name": "Multi-agency / multi leadership environment",
        "resource_uri": "/services/sm/challenge/3/"
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    "description": "Some response plan",
    "document": null,
    "endtime": "2020-02-11T15:08:00",
    "hazardtype": {
        "category": {

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        "id": 1,
        "name": "Forest fire",
        "resource_uri": "/services/sm/hazardcategory/1/"
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    "id": 5,
    "name": "Forest fire: Wind-driven fire in level
terrain",
    "resource_uri": "/services/sm/hazardtype/5/"

},
"id": 79,
"measures": [],
"notifications": [],
"objectives": [
{
    "explanation": null,
    "id": 35,
    "objective": {
        "hazardtype": {
            "category": {
                "id": 1,
                "name": "Forest fire",
                "resource_uri":
"/services/sm/hazardcategory/1/"
            },
            "id": 1,
            "name": "Forest fire",
            "resource_uri":
"/services/sm/hazardtype/1/"
        },
        "id": 6,
        "name": "Confine",
        "resource_uri":
"/services/sm/responseplancommonobjective/6/",
        "type": {
            "id": 2,
            "name": "Hazard",
            "resource_uri":
"/services/sm/responseplancommonobjectivetype/2/"
        }
    }
}
]
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        },
        "resource_uri": "/services/sm/responseplanobjectives/35/",
        "responseplan": "/services/sm/responseplan/79/"
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"objectivesexplanation": null,
"organisationalcomplexity": {
    "id": 3,
    "name": "National",
    "resource_uri": "/services/sm/responseplanorganisationalcomplexity/3/"
},
"resource_uri": "/services/sm/responseplan/79/",
"responseplanstrategydescription": null,
"situationassessment": {
    "conditions": {
        "accrainfall24h": null,
        "datetime": "2020-02-11T09:23:00",
        "dewpoint": 18.87,
        "humidity": 43.0,
        "id": 148,
        "progr": 0,
        "rainfallfor": 0.0,
        "rainfallintensity": null,
        "resource_uri": "/services/sm/condition/148/",
        "snapshots": [
            "/services/sm/scenariosnapshot/31/"
        ],
        "temperature": 33.07,
        "verified": true,
        "winddirection": 102.0,
        "windgust": 3,
        "windspeed": 2
    },
    "id": 11,
    "impactsummary": null,
    "resource_uri": "/services/sm/situationassessment/11/"
}

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        "screenshots": [],
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    },
    "snapshots": [
        "/services/sm/scenariosnapshot/31/"
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        "name": "Confinement",
        "resource_uri": "/services/sm/responseplanstrategy/3/"
    },
    "strategyexplanation": "This is a test strategy"
}
],
"risklevel": {
    "id": 4,
    "name": "high",
    "resource_uri": "/services/sm/risklevel/4/"
},
"scenario": "/services/sm/scenario/214/",
"selected": false,
"sensorthresholds": null,
"simulations": [],
"source": "",
"status": {
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    "name": "Actual",
    "resource_uri": "/services/sm/scenariostatus/1/"
},
"urgency": {
    "id": 3,
    "name": "Historic",
    "resource_uri": "/services/sm/scenariourgency/3/"
}
}
},
"simulation": {

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"http://esb2.heimdall.sp/services/rest/simulations?simulationId=425b6e5f-
bfd6-41bb-ac9f-b7e9f796c9f5",
        "sim_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
        "impactbuildings_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
        "impactroads_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
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            "resource_uri":
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d89ee996b82c/gois?filter=priority_action_point%20!=%20%27None%27"
        },
        "isas_affectedroads_json": {
            "resource_uri":
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018b27eb32a9/gois"
        },
        "isas_results_uri":
"http://esb2.heimdall.sp/services/isas/job/ec0f38ac-cace-4b23-9a70-
c73315a7a929/results",
        "isas_popaffected_total": 0
    },
    "whatifsimulations": [
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"http://esb2.heimdall.sp/services/rest/simulations?simulationId=425b6e5f-
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c25f09db3f0c_02.276Z.jpg",
            "impactbuildings_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
            "impactroads_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
            "isas_affectedbuildings_json": {
                "resource_uri":
"http://esb2.heimdall.sp/services/isas/result/781b95fd-758c-4940-8894-
d89ee996b82c/gois?filter=priority_action_point%20!=%20%27None%27"
            }
        }
    ]
}

```

```

        },
        "isas_affectedroads_json": {
            "resource_uri":
"http://esb2.heimdall.sp/services/isas/result/14a70b84-0ac3-417c-8e34-
018b27eb32a9/gois"
        },
        "isas_results_buildings_uri":
"http://esb2.heimdall.sp/services/isas/job/ec0f38ac-cace-4b23-9a70-
c73315a7a929/results",
        "isas_popaffected_total": 0
    },
    {
        "sim_results_uri":
"http://esb2.heimdall.sp/services/rest/simulations?simulationId=425b6e5f-
bfd6-41bb-ac9f-b7e9f796c9f5",
        "sim_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
        "impactbuildings_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
        "impactroads_image_uri":
"http://esb2.heimdall.sp/services/smmedia/image_c9e2d6aa-a3fd-436a-a9ce-
c25f09db3f0c_02.276Z.jpg",
        "isas_affectedbuildings_json": {
            "resource_uri":
"http://esb2.heimdall.sp/services/isas/result/781b95fd-758c-4940-8894-
d89ee996b82c/gois?filter=priority_action_point%20!=%20%27None%27"
        },
        "isas_affectedroads_json": {
            "resource_uri":
"http://esb2.heimdall.sp/services/isas/result/14a70b84-0ac3-417c-8e34-
018b27eb32a9/gois"
        },
        "isas_results_uri":
"http://esb2.heimdall.sp/services/isas/job/ec0f38ac-cace-4b23-9a70-
c73315a7a929/results",
        "isas_popaffected_total": 0
    }
]
}

```

Annex B: SITREP example response body

```
<!--
    Emergency Data Exchange Language Situation Reporting (EDXL-SitRep)
Version 1.0

    Committee Specification 02
    06 October 2016
    Copyright (c) OASIS Open 2016. All Rights Reserved.

    Source: http://docs.oasis-open.org/emergency/edxl-
sitrep/v1.0/cs02/examples/

    Latest version of the specification: http://docs.oasis-
open.org/emergency/edxl-sitrep/v1.0/edxl-sitrep-v1.0.html

    TC IPR Statement: https://www.oasis-
open.org/committees/emergency/ipr.php

-->
<edxlDistribution xlink:type="extended"
    xsi:schemaLocation="urn:oasis:names:tc:emergency:EDXL:DE:2.0
        ../../schemas/edxl-de-v2.0-wd11.xsd
        http://www.w3.org/2000/09/xmldsig#
        ./de2-supporting-schema/xmldsig-core-schema.xsd
        http://www.w3.org/2001/04/xmlenc#
        ./de2-supporting-schema/xenc-schema.xsd"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns="urn:oasis:names:tc:emergency:EDXL:DE:2.0"
    xmlns:de="urn:oasis:names:tc:emergency:EDXL:DE:2.0"
    xmlns:ext="urn:oasis:names:tc:emergency:edxl:extension:1.0"
    xmlns:edxl-gsf="urn:oasis:names:tc:emergency:edxl:gsf:1.0"
    xmlns:ct="urn:oasis:names:tc:emergency:edxl:ct:1.0"
    xmlns:gml="http://www.opengis.net/gml/3.2"
    xmlns:xlink="http://www.w3.org/1999/xlink">

    <descriptor>
        <combinedConfidentiality>{{confidentiality}}</combinedConfidentiality>
        <language>{{ language }}</language>
        <explicitAddress>
            <explicitAddressScheme>{{ explicitAddressScheme }}</explicitAddressScheme>
            <explicitAddressValue>{{explicitAddressValue}}</explicitAddressValue>
        </explicitAddress>
    
```

```

<recipientRole>{{ recipientRole }}</recipientRole>
<targetAreas>
    <areaKind>{{ areaKind }}</areaKind>
    <areaGrouping>{{ areaGrouping }}</areaGrouping>
    <targetArea>
        <EDXLGeoPoliticalLocation>{{areaDesc}}</EDXLGeoPoliticalLocation>
        <CircleByCenterPoint>{{circle,radius}}</CircleByCenterPoint>
        <Polygon>{{polygon}}</Polygon>
    </targetArea>
</targetAreas>
</descriptor>
<distributionID>{{ distributionid }}</distributionID>
<senderID>{{ senderid }}</senderID>
<dateTimeSent>2020-07-14T08:59:38.458792</dateTimeSent>
<dateTimeExpires>2020-07-15T08:59:38.458792</dateTimeExpires>
<distributionStatus>Actual</distributionStatus>
<DistributionKind>
    <DistributionKindDefault>

<ct:ValueListURI>urn:oasis:names:tc:emergency:EDXL:DE:2.0:Defaults:DistributionType</ct:ValueListURI>
    <ct:Value>Report</ct:Value>
</DistributionKindDefault>
</DistributionKind>
<urgency>Historic</urgency>
<certainty>Unknown</certainty>
<IncidentID>214</IncidentID>
<IncidentDescription>LaJonquera_FF_20120722</IncidentDescription>
<contentObject>
    <contentDescription>EDXL-SitRep</contentDescription>
    <contentKeyword>

<valueListUrn>http://icnet.mitre.org/ValueLists/ContentKeywords</valueListUrn>
    <value>EDXL-SitRep</value>
</contentKeyword>
<xmlContent>
    <embeddedXMLContent>
        <SitRep

```

```

xmlns="urn:oasis:names:tc:emergency:EDXL:SitRep:1.0">
<MessageID>{{ messageid }}</MessageID>
<PreparedBy>
  <PersonDetails
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">
    <PersonName
      xmlns="urn:oasis:names:tc:emergency:edxl:ciq:1.0:xnl">
      <NameElement>{{ preparedby_name }}</NameElement>
    </PersonName>
  </PersonDetails>
  <TimeValue
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{ preparedby_time }}
  </TimeValue>
</PreparedBy>
<AuthorizedBy>
  <PersonDetails
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">
    <PersonName
      xmlns="urn:oasis:names:tc:emergency:edxl:ciq:1.0:xnl">
      <NameElement>{{ authorizedby_name }}</NameElement>
    </PersonName>
  </PersonDetails>
  <TimeValue
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{ authorizedby_time }}
  </TimeValue>
</AuthorizedBy>
<ReportPurpose>{{ reportpurpose }}</ReportPurpose>
<ReportNumber>{{ reportnumber }}</ReportNumber>
<ReportVersion>
  <Version>
    <ValueListURI
      xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">http://icnet.mitre.org/ValueLists/SitRep/version
    </ValueListURI>
    <Value>

```

```

        xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">>{{{
reportversion }}

        </Value>
        </Version>
    </ReportVersion>
    <ForTimePeriod>
        <FromDateTime
            xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">>{{{
fromdatetime }}}
```

</FromDateTime>

<ToDateTime

```
        xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">>{{{
todatetime }}}}
```

</ToDateTime>

</ForTimePeriod>

<IncidentID>214</IncidentID>

<IncidentLifecyclePhase>

<IncidentLifecycle>

<ValueListURI

```
        xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">>http://icnet.mitre.org/ValueLists/SitRep/incidentlifecyclephase
```

</ValueListURI>

<Value

```
        xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">>{{{
incidentlifecyclephase }}}}
```

</Value>

<IncidentLifecycle>

<IncidentLifecyclePhase>

<Urgency>

<Urgency>

<ValueListURI

```
        xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">>http://icnet.mitre.org/ValueLists/SitRep/urgency
```

</ValueListURI>

<Value

```
        xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">>Historic
```

</Value>

</Urgency>

```

        </Urgency>
        <ReportConfidence>
            <ValueListURI
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">http://icnet.mitre.org/ValueLists/SitRep/confidence
            </ValueListURI>
            <Value
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">Unknown
            </Value>
        </ReportConfidence>
        <ActionPlan>This is a test strategy</ActionPlan>
        <Report
            xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
            xsi:type="SituationInformation">
            <IncidentName>LaJonquera_FF_20120722</IncidentName>
            <IncidentKind>Fire</IncidentKind>
            <ext:extension>
                <ext:community>http://heimdall-h2020.eu/layers/hazard</ext:community>
                <ext:id>hazardLayer</ext:id>
                <ext:parameter>
                    <ext:nameURI>http://heimdall-h2020.eu/layers/hazard/subhazardtype</ext:nameURI>
                    <ext:value>Forest fire: Wind-driven fire in level terrain</ext:value>
                </ext:parameter>
            </ext:extension>
            <IncidentStartTime>2012-07-22T12:54:32.527Z</IncidentStartTime>
            <IncidentLocation>
                <EDXLGeoLocation
                    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">
                    <Point
                        xmlns="http://www.opengis.net/gml/3.2">
                        <pos>42.4334247596843 2.863737287155459</pos>
                    </Point>
                </EDXLGeoLocation>
            </IncidentLocation>
            <JurisdictionInformation>

```

```

        <Name>{{ jurisdictioninformationname }}</Name>
        <GeographicSize>{{ jurisdictioninformationgeosize
}}</GeographicSize>
        <Location>
            <EDXLGeoPoliticalLocation
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">
                <Address
                    xmlns="urn:oasis:names:tc:emergency:edxl:ciq:1.0:xal">
                    <Country>
                        <NameElement>{{ jurisdictioninformationcountry
}}</NameElement>
                    </Country>
                    <AdministrativeArea>
                        <NameElement>{{ jurisdictioninformationadmin
}}</NameElement>
                    </AdministrativeArea>
                </Address>
            </EDXLGeoPoliticalLocation>
        </Location>
        <Description>{{ jurisdictioninformationdesc }}</Description>
    </JurisdictionInformation>
</Report>
</SitRep>
</embeddedXMLContent>
</xmlContent>
</contentObject>
<contentObject>
    <contentDescription>EDXL-SitRep</contentDescription>
    <contentKeyword>

<valueListUrn>http://icnet.mitre.org/ValueLists/ContentKeywords</valueListU
rn>
    <value>EDXL-SitRep</value>
</contentKeyword>
<xmlContent>
    <embeddedXMLContent>
        <SitRep
            xmlns="urn:oasis:names:tc:emergency:EDXL:SitRep:1.0">
            <MessageID>9d2cbf0b-e0dc-4d88-b6b5-e40482663853</MessageID>

```

```

<PreparedBy>
  <PersonDetails
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">
    <PersonName
      xmlns="urn:oasis:names:tc:emergency:edxl:ciq:1.0:xnl">
      <NameElement>{{ preparedby_name }}</NameElement>
    </PersonName>
  </PersonDetails>
  <TimeValue
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{
preparedby_time }}
  </TimeValue>
</PreparedBy>
<AuthorizedBy>
  <PersonDetails
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">
    <PersonName
      xmlns="urn:oasis:names:tc:emergency:edxl:ciq:1.0:xnl">
      <NameElement>{{ authorizedby_name }}</NameElement>
    </PersonName>
  </PersonDetails>
  <TimeValue
    xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{
authorizedby_time }}
  </TimeValue>
</AuthorizedBy>
<ReportPurpose>{{ reportpurpose }}</ReportPurpose>
<ReportNumber>{{ reportnumber }}</ReportNumber>
<ReportVersion>
  <Version>
    <ValueListURI
      xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">http://icnet.mitre.org/Val
ueLists/SitRep/version
    </ValueListURI>
    <Value
      xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{
reportversion }}</Value>
  </Version>
</ReportVersion>

```

```

        </Version>
    </ReportVersion>
    <ForTimePeriod>
        <FromDateTime
            xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{fromdatetime}}
        </FromDateTime>
        <ToDateTime
            xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{todatetime}}
        </ToDateTime>
    </ForTimePeriod>
    <IncidentID>214</IncidentID>
    <IncidentLifecyclePhase>
        <IncidentLifecycle>
            <ValueListURI
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">http://icnet.mitre.org/ValueLists/SitRep/incidentlifecyclephase
            </ValueListURI>
            <Value
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{incidentlifecyclephase}}
            </Value>
        </IncidentLifecycle>
    </IncidentLifecyclePhase>
    <Urgency>
        <Urgency>
            <ValueListURI
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">http://icnet.mitre.org/ValueLists/SitRep/urgency
            </ValueListURI>
            <Value
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">Historic
            </Value>
        </Urgency>
    </Urgency>
    <ReportConfidence>
        <ValueListURI

```

```

xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">http://icnet.mitre.org/ValueLists/SitRep/confidence
    </ValueListURI>
    <Value
        xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">Unknown
    </Value>
</ReportConfidence>
<Report
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:type="ManagementReportingSummary">
    <SituationSummary>
        <WeatherEffects>
            <METARReadings
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">
                <ObservationTime>2020-02-11T09:23:00</ObservationTime>
                <TempC>33.07</TempC>
                <DewPointC>18.87</DewPointC>
                <WindDirDegrees>102</WindDirDegrees>
                <WindSpeedkt>2</WindSpeedkt>
                <WindGustkt>3</WindGustkt>
            </METARReadings>
            <WeatherConcerns
                xmlns="urn:oasis:names:tc:emergency:edxl:ct:1.0">{{weatherconcerns }}</WeatherConcerns>
            </WeatherEffects>
            <ext:extension>
                <ext:community>http://heimdall-h2020.eu/layers/weather</ext:community>
                <ext:id>weatherLayer</ext:id>
                <ext:parameter>
                    <ext:nameURI>http://heimdall-h2020.eu/layers/weather/current/humidity</ext:nameURI>
                    <ext:value>43</ext:value>
                </ext:parameter>
                <ext:parameter>
                    <ext:nameURI>http://heimdall-h2020.eu/layers/weather/forecast/1/forecasthours</ext:nameURI>
                    <ext:value>1</ext:value>

```

```

        </ext:parameter>
    </ext:extension>
    <ext:extension>
        <ext:community>http://heimdall-
h2020.eu/layers/simulation</ext:community>
        <ext:id>simulationLayer</ext:id>
        <ext:parameter>
            <ext:nameURI>http://heimdall-
h2020.eu/layers/simulation/flamelength/head</ext:nameURI>
            <ext:value>{{ flamelengthhead }}</ext:value>
        </ext:parameter>
        <ext:parameter>
            <ext:nameURI>http://heimdall-
h2020.eu/layers/simulation/firelineintensity</ext:nameURI>
            <ext:value>{{ firelineintensity }}</ext:value>
        </ext:parameter>
        <ext:parameter>
            <ext:nameURI>http://heimdall-
h2020.eu/layers/simulation/rateofspread</ext:nameURI>
            <ext:value>{{ rateofspread }}</ext:value>
        </ext:parameter>
        <ext:parameter>
            <ext:nameURI>http://heimdall-
h2020.eu/layers/simulation/outofsuppressioncapacity</ext:nameURI>
            <ext:value>{{ outofsuppressioncapacity }}</ext:value>
        </ext:parameter>
    </ext:extension>
    <ext:extension>
        <ext:community>http://heimdall-
h2020.eu/layers/impact</ext:community>
        <ext:id>impactLayer</ext:id>
        <ext:parameter>
            <ext:nameURI>http://heimdall-
h2020.eu/layers/impact/popaffected</ext:nameURI>
            <ext:value>135</ext:value>
        </ext:parameter>
    </ext:extension>
</SituationSummary>
</Report>
<Report

```

```

        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:type="CasualtyAndIllnessSummaryType">
    <summaryCount>
        <casualtyAndIllnessCountCategory>
            <countCategory>Fatalities</countCategory>
        </casualtyAndIllnessCountCategory>
        <nonResponderSummaryCount>5</nonResponderSummaryCount>
    </summaryCount>
</Report>
</SitRep>
</embeddedXMLContent>
</xmlContent>
</contentObject>
<contentObject
xlink:label="contentObject_sim_result" xlink:type="resource">
    <contentDescriptor>
        <contentDescription>Simulation Result</contentDescription>
    </contentDescriptor>
    <otherContent>
        <mimeType>application/json</mimeType>
    </otherContent>
</contentObject>
<uri>http://esb2.heimdall.sp/services/rest/simulations?simulationId=4981d05
f-889c-4fbe-bc6a-685a552dddbe</uri>
    </otherContent>
</contentObject>
<contentObject
xlink:label="contentObject_sim_image" xlink:type="resource">
    <contentDescriptor>
        <contentDescription>Simulation Image</contentDescription>
    </contentDescriptor>
    <otherContent>
        <mimeType>image/png</mimeType>
    </otherContent>
</contentObject>
<uri>http://esb.heimdall.sp/services/smmedia/services/smmedia/scenario_114/
44.734Z.png</uri>
    </otherContent>
</contentObject>
<contentObject
xlink:label="contentObject_sim_impact_b_image" xlink:type="resource">
    <contentDescriptor>

```

```

<contentDescription>Affected Buildings Image</contentDescription>
</contentDescriptor>
<otherContent>
<mimeType>image/png</mimeType>

<uri>http://esb.heimdall.sp/services/smmedia/services/smmedia/scenario_114/
44.76456Z.png</uri>
</otherContent>
</contentObject>
<contentObject
xlink:type="resource"
xlink:label="contentObject_sim_impact_r_image">
<contentDescriptor>
<contentDescription>Affected Roads Image</contentDescription>
</contentDescriptor>
<otherContent>
<mimeType>image/png</mimeType>

<uri>http://esb.heimdall.sp/services/smmedia/services/smmedia/scenario_114/
44.778Z.png</uri>
</otherContent>
</contentObject>
<contentObject
xlink:type="resource"
xlink:label="contentObject_sim_affected_b_list">
<contentDescriptor>
<contentDescription>Affected Buildings List</contentDescription>
</contentDescriptor>
<otherContent>
<mimeType>application/json</mimeType>
<uri>http://esb2.heimdall.sp/services/isas/result/5ecfe37b-c64b-49ed-
8b86-439cc7e3dfde/gois</uri>
</otherContent>
</contentObject>
<contentObject
xlink:type="resource"
xlink:label="contentObject_sim_affected_r_list">
<contentDescriptor>
<contentDescription>Affected Roads List</contentDescription>
</contentDescriptor>
<otherContent>
<mimeType>application/json</mimeType>
<uri>http://esb2.heimdall.sp/services/isas/result/a85be077-a5a7-4fab-
8564-a9d7e4df78bf/gois?filter=name != 'Unknown'</uri>

```

```

        </otherContent>
    </contentObject>
    <contentObject xlink:type="resource" xlink:label="contentObject_sim_isas_result">
        <contentDescriptor>
            <contentDescription>Impact Summary</contentDescription>
        </contentDescriptor>
        <otherContent>
            <mimeType>application/json</mimeType>
            <uri>http://esb2.heimdall.sp/services/isas/job/5920dd6a-0bd4-4c93-84ef-7ac36cfe14f6/results</uri>
        </otherContent>
    </contentObject>
    <contentObject xlink:type="resource" xlink:label="contentObject_responsePlan1">
        <contentDescriptor>
            <contentDescription>Response Plan</contentDescription>
        </contentDescriptor>
        <otherContent>
            <mimeType>application/json</mimeType>
            <uri>/services/sm/responseplan/79/</uri>
        </otherContent>
    </contentObject>
    <contentObject xlink:type="resource" xlink:label="contentObject_whatif0_result">
        <contentDescriptor>
            <contentDescription>Whatif Simulation Result</contentDescription>
        </contentDescriptor>
        <otherContent>
            <mimeType>application/json</mimeType>
            <uri>http://esb2.heimdall.sp/services/rest/simulations?simulationId=4981d05f-889c-4fbe-bc6a-685a552dddbe</uri>
        </otherContent>
    </contentObject>
    <contentObject xlink:type="resource" xlink:label="contentObject_whatif0_image">
        <contentDescriptor>
            <contentDescription>Whatif Simulation Image</contentDescription>
        </contentDescriptor>

```

```

<otherContent>
  <mimeType>image/png</mimeType>

<uri>http://esb.heimdall.sp/services/smmedia/services/smmedia/scenario_114/
44.734Z.png</uri>
  </otherContent>
</contentObject>
<contentObject      xlink:type="resource"      xlink:label="contentObject_
whatif0_impact_b_image">
  <contentDescriptor>
    <contentDescription>Whatif          Affected          Buildings
Image</contentDescription>
  </contentDescriptor>
  <otherContent>
    <mimeType>image/png</mimeType>

<uri>http://esb.heimdall.sp/services/smmedia/services/smmedia/scenario_114/
44.76456Z.png</uri>
  </otherContent>
</contentObject>
<contentObject      xlink:type="resource"      xlink:label="contentObject_
whatif0_impact_r_image">
  <contentDescriptor>
    <contentDescription>Whatif Affected Roads Image</contentDescription>
  </contentDescriptor>
  <otherContent>
    <mimeType>image/png</mimeType>

<uri>http://esb.heimdall.sp/services/smmedia/services/smmedia/scenario_114/
44.778Z.png</uri>
  </otherContent>
</contentObject>
<contentObject      xlink:type="resource"      xlink:label="contentObject_
whatif0_affected_b_list">
  <contentDescriptor>
    <contentDescription>Whatif          Affected          Buildings
List</contentDescription>
  </contentDescriptor>
  <otherContent>
    <mimeType>application/json</mimeType>

```

```
        <uri>http://esb2.heimdall.sp/services/isas/result/5ecfe37b-c64b-49ed-  
8b86-439cc7e3dfde/gois</uri>  
    </otherContent>  
  </contentObject>  
  <contentObject      xlink:type="resource"      xlink:label="contentObject_  
whatif0_affected_r_list">  
    <contentDescriptor>  
      <contentDescription>Whatif Affected Roads List</contentDescription>  
    </contentDescriptor>  
    <otherContent>  
      <mimeType>application/json</mimeType>  
      <uri>http://esb2.heimdall.sp/services/isas/result/a85be077-a5a7-4fab-  
8564-a9d7e4df78bf/gois?filter=name != 'Unknown'</uri>  
    </otherContent>  
  </contentObject>  
  <contentObject      xlink:type="resource"      xlink:label="contentObject_  
whatif0_isas_result">  
    <contentDescriptor>  
      <contentDescription>Whatif Impact Summary</contentDescription>  
    </contentDescriptor>  
    <otherContent>  
      <mimeType>application/json</mimeType>  
      <uri>http://esb2.heimdall.sp/services/isas/job/5920dd6a-0bd4-4c93-  
84ef-7ac36cf14f6/results</uri>  
    </otherContent>  
  </contentObject>  
</edxlDistribution>
```