EUROPEAN COMMISSION
DIRECTORATE-GENERAL
HUMANITARIAN AID AND CIVIL PROTECTION - ECHO
ECHO A - Strategy, Policy and International Co-operation
Unit A.5 - Civil Protection Policy
Brussels, ECHO.A.5 (2016) 3129102

UD-RASP- Urban Disaster Resilience Through Risk Assessment and Sustainable Planning

Ref. No. ECHO/SUB/2016/740186/PREV19

D5.2 – Web Information System

(31. October 2018)

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Task	T5 - Web-based information system	
Action	A5.1	
Dissemination level	✓ Public ○ Restricted to other programme partners (including DG ECHO) ○ Restricted to a group specified by the consortium (including DG ECHO) ○ Confidential, only for members of the consortium (including DG ECHO)	
Publishing date	October 2018	
Task/activity leader	Task: IABG	Activity: IABG
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Short summary	Information platform to build up awareness and capacity for local stakeholders for urban planning, risk assessment and civil protection – Web platform *http://www.iabg-ta.com/projects/udrasp/index.html (restricted access till 31 Dec 2018)* – Viewer with UDRASP data layer in different categories: risk (current / future scenarios, other), flash flood, coastal erosion, urban-/ administration- / additional-/ and base layer) – Web site functionality like measuring, zoom slider, scale bar, overview map, live mouse over coordinates, geometry labelling and attribution, information slider – Messaging function	
Keywords	Geodata, OGC conform, web map service, web information system, data management, open source, public access, dissemination, interactive visualization, information exchange	

The research leading to these results has received funding from the European Commission Directorate General Humanitarian Aid And Civil Protection (ECHO) under grant agreement No.ECHO/SUB/2016/740186/PREV19.
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Table of Contents

1 Web-based information system 3
1.1 Technical Characteristics 3
1.1.1 Database 4
1.1.2 Web Service 4
1.1.3 Web Application 5
1.1.4 Access 6
1.2 Layout and Functionalities 6
1.2.1 Layout 6
1.2.2 Functionalities 8
1.2.3 Summary of tools and functionalities 10
2 Data Source and Characteristics 13

List of figures

Figure 1: Components of the web-based information system 4
Figure 2: Structure of web application 5
Figure 3: Webpage Layout 6
Figure 4: Panel for data layers 7
Figure 5: Map data frame functions 8
Figure 6: Reporting chain 10

List of tables

Table 1: Tools and functionalities of the web information system 10
Table 2: Overview of integrated data in the web system 13

Abbreviations

APAL	Agence de Protection et d'Aménagement du Littoral
CSS	Cascading Style Sheet
EUSI	European Space Imaging
GIS	Geographic Information System
HTTP	Hypertext Transfer Protocol
INS	Institut national de la statistique
OGC	Open Geospatial Consortium
OSM	OpenStreetMap
UDRASP	Urban Disaster Resilience through Risk Assessment and Sustainable Planning
WTMS	Web Map Tile Service

1 Web-based information system

The general requirement of the web information system is to view spatial information about the city of Monastir in a user-friendly and easily accessible way. Furthermore, the future administrators of the municipality have to be able to edit and update the underlying geodata that are derived from the offline GIS system.[1]

The UDRASP GIS system that serves as a base documentation system with an intelligent database has been created during the project runtime. The geospatial data enables the municipality to analyze local risks and the consequences for the urban environment in a spatial context.

The importance of the GIS and a detailed description of the implemented system can be found in Deliverable 1.1 Technical Documentation[2] and D5.1 GIS Implementation.[3] The UDRASP GIS serves as a **centralized database for spatial data**, where data can be gathered, updated and analyzed. It contains all relevant geodata in a consistent data structure, which is mandatory for standardized data transfer to the web system. The UDRASP geodatabase is thus the **main source of information** for the web-based information system.

The complementary web-based information system serves as a tool that facilitates communication between the local stakeholders. In the following chapter, the web-based information system is shortly described.

1.1 Technical Characteristics

The web-based information system is hosted on Cloud-Services. The provider AcuGIS.com provides the server. The structure consists of multiple interacting components and is illustrated in Figure 1. The system architecture of the web-based information system consists of a database, web service and web application. By using PostgreSQL, GeoServer and NodeJS the service is based exclusively on Open Source Software.

[1] See D5.1 GIS Implementation
[2] D1.1 see chapter 3 and 5 ff.
[3] D5.1 GIS Implementation

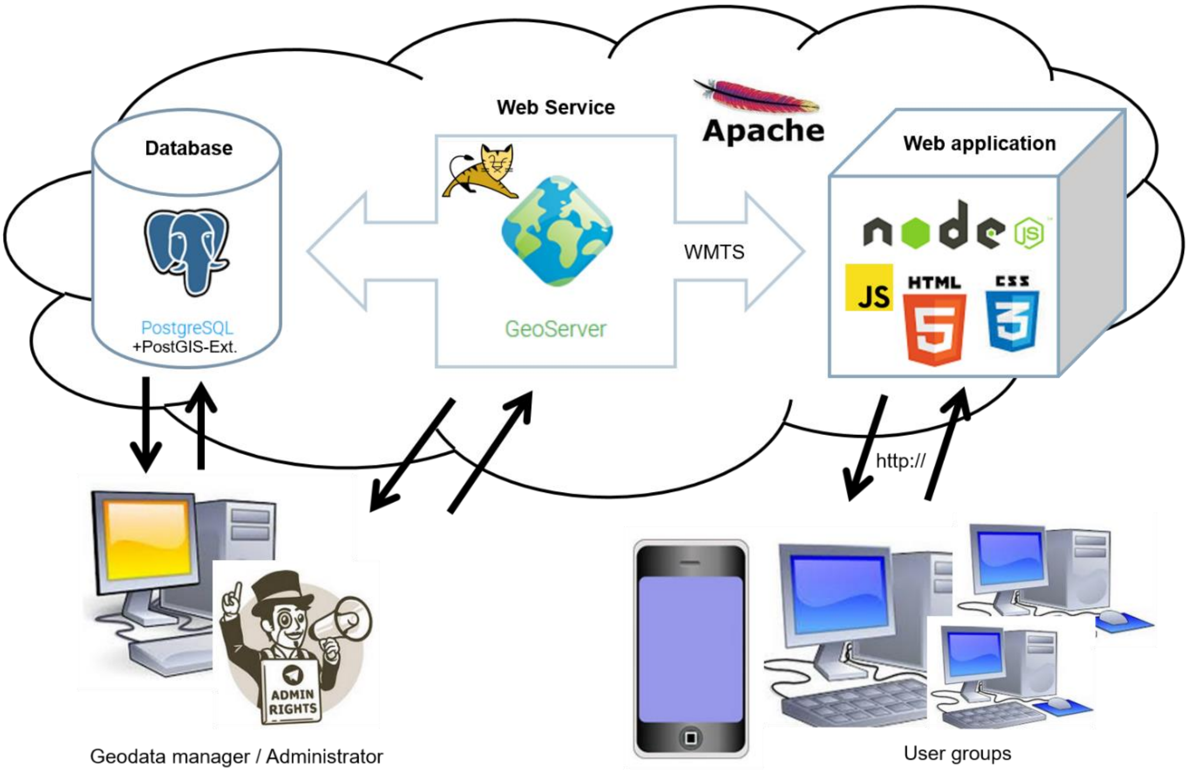


Figure 1: Components of the web-based information system

1.1.1 Database

In the database, the open source, object-relational database system PostgreSQL is used to store the relevant spatial and non-spatial information. Furthermore, the PostGIS extension is included for handling the geospatial data. The input data for the web-based information system consist of the previously created UDRASP geodatabase containing the Urban Atlas based land use and land cover classifications. Furthermore, the conducted risk analyses for flash flood and coastal erosion were included in the information system. Layers with additional information concerning the administrative boundaries of the region as well as the natural conditions such as geology, faults and watersheds were provided by the municipality of Monastir. The input data from the geodatabase were transferred from ESRI file based format to PostgreSQL to integrate them into the web-system database.

1.1.2 Web Service

The geodata are published by using the webserver GeoServer. The software provides the data sets as OGC-conform web services in the standardized WMTS format. It additionally provides satellite imagery from WorldView-3 data[4] as a mosaic. Additionally satellite imagery from WorldView-3 data, displayed as mosaic are is provided via the Geoserver. Furthermore, OpenLayers by OpenStreetmap are accessed via Apache. After publishing the data in the web service, they can subsequently integrated into the the final web application. An Apache HTTP server hosts both the web application and the GeoServer.

[4] See D1.1 Chapter 3.1.1

1.1.3 Web Application

The web application for the visualization of the data is based on open source technology. The generated web platform offers a responsive design and runs on desktop clients as well as mobile devices. The client requires a web browser and a stable internet access to run the application.

The minimum server side hardware requirements are as follows:

- CPU: Intel(R) Xeon(R) CPU E5-2650 v4 @ 2.20GHz, 1 core
- RAM: 2 GB
- DISK: 50 GB

The web application is based on JavaScript (incl. OpenLayers framework), HTML5 and CSS stylesheets. In the web application, Javascript libraries are used in combination with CSS. libraries to create a user-friendly web interface (Figure 2).

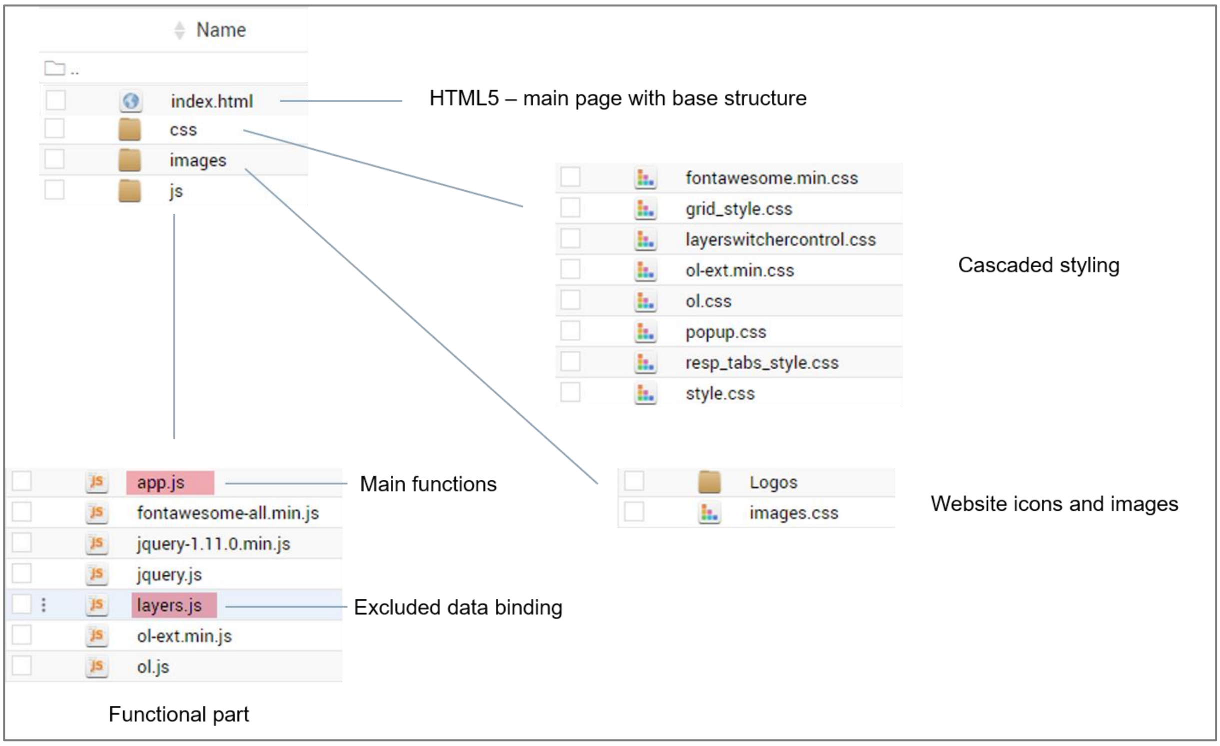


Figure 2: Structure of web application

To retrieve information, the client sends a request to the web server (Apache), which then sends a WTMS request to GeoServer. In a next step, GeoServer sends a request to the PostgreSQL database to obtain the spatial or non-spatial information. In a final step, GeoServer returns the result to the client via Apache as an http-response.

1.1.4 Access

The web system is actually running on the IABG web based platform: http://www.iabg-ta.com/projects/udrasp/index.html with restricted access. The final implementation on a municipal platform, hosted by the Municipality of Monastir, is expected up to the beginning of Jan 2019 latest.

1.2 Layout and Functionalities

1.2.1 Layout

The layout of the default webpage is shown in Figure 3. The webpage is structured as a single page application based on a w3school-template. On the top, the title of the website is displayed. In the center of the webpage, the main map panel is located. This is the main component that links the spatial to the non-spatial information.

On the webpage, the information is provided in English as well as French. The three main sections of the webpage can be accessed via tabs at the top of the page:

- Map - Access to the map data frame
- Layer Info – Information about the individual layers
- About – Information about content and purpose, technical details and terms of use

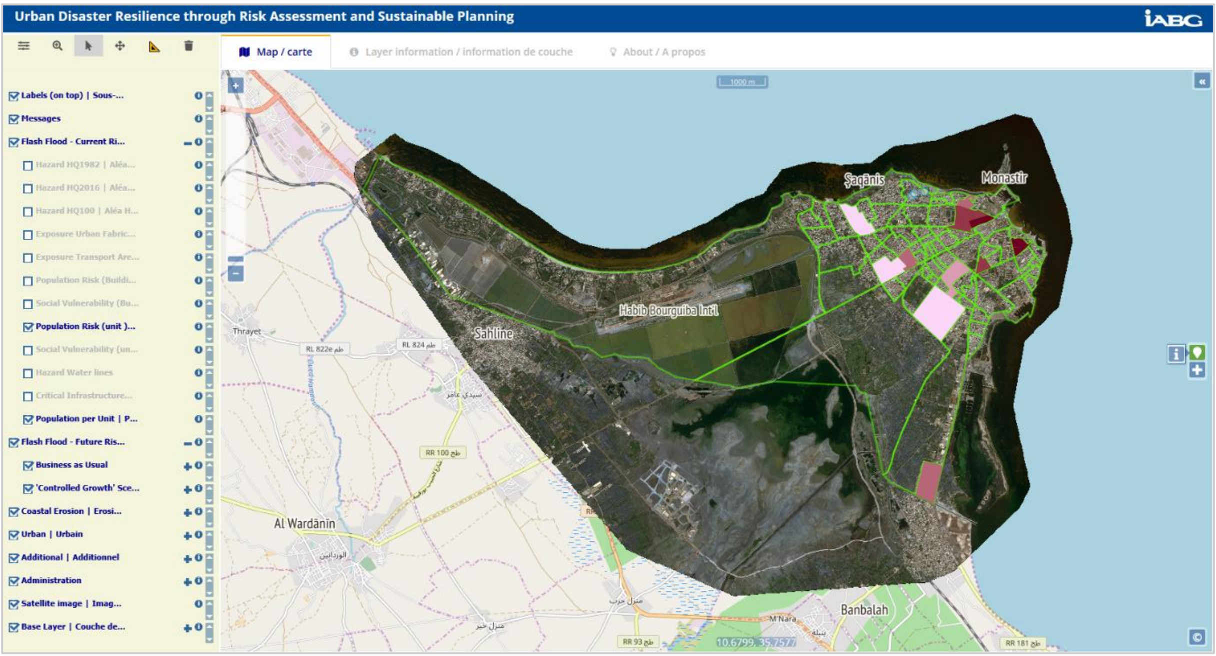


Figure 3: Webpage Layout

In the left panel, the data are thematically grouped into eight categories. The web application provides several tools to change and adapt the display of the data layers, which are described in the next chapter. Tools connected with zooming and measuring can be accessed in the top left corner. By drawing a box, the user can zoom to the requested extent. Furthermore, distances on the map can be measured. Further tools include collapsible and buttons to access subcategories of layer groups, dragable elements to adapt the layer hierarchy and an information-button to access meta-information about the individual layers.

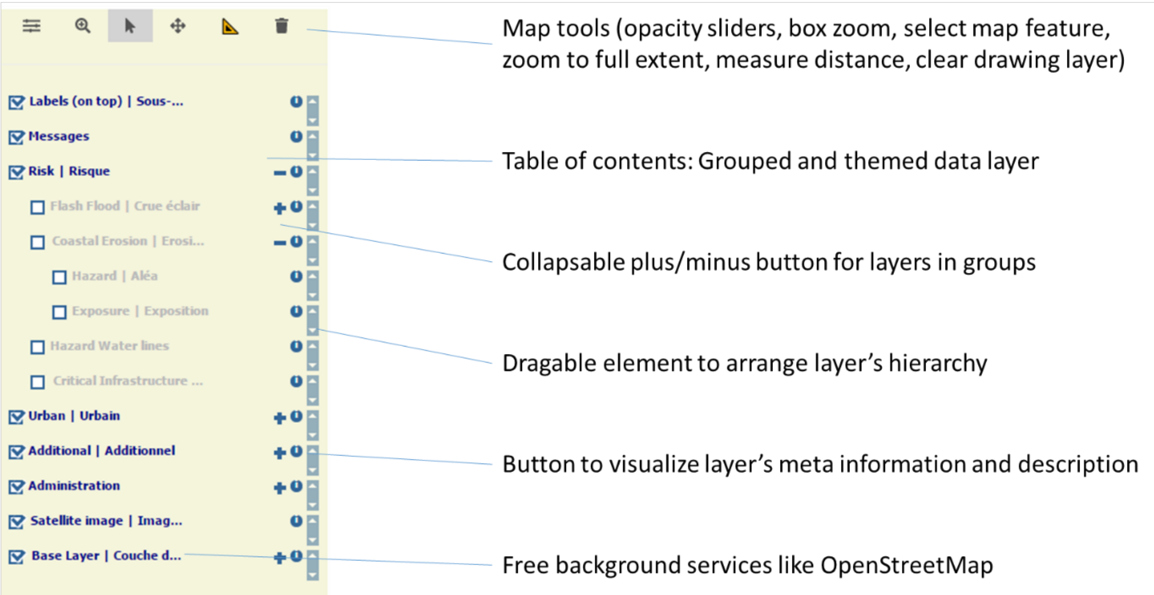


Figure 4: Panel for data layers

The web-functions that are provided in the map data frame are illustrated in Figure 5. An integrated zoom slider allows the user to change the scale of the map, by adjusting the controls. By selecting individual features within activated layers, additional information about the metadata can be accessed and a legend provides details about the symbology. Further tools include an interactive scale bar and live mouse over coordinates.

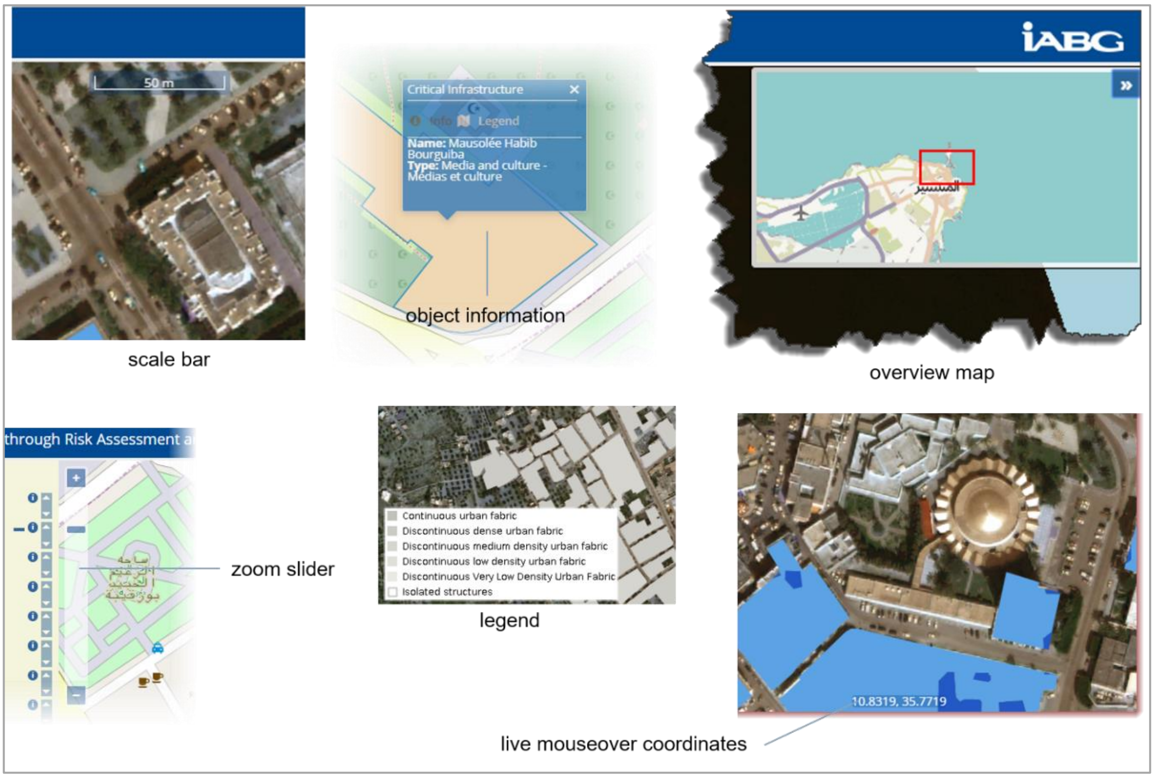


Figure 5: Map data frame functions

1.2.2 Functionalities

Zoom

Hint: *The zoom function has a range from 1:1000 m (minimum scale) to 1:20 m (maximum scale). The current map scale is displayed in the upper middle of the map data frame.*

To zoom in or out with the mouse, set the mouse pointer over the map data frame and turn the mouse wheel.

To zoom in or out with the 'Zoom slider' in the upper left of the map data frame, click and drag the slider control up or down.

To zoom in to a specified area, select the 'Zoom to rectangle' tool from the left panel and click and drag a rectangle in the map data frame.

To zoom out to the minimum scale of 1:1000 m, click the 'Zoom to extent' tool in the left panel.

Display data

To display the content of a layer in the map data frame, click on the checkbox in front of a layer name in the left panel. The layer names color is changed from grey to blue.

Hint: *If the check marked layer is part of a group layer, the group layer needs to be check marked too. The group layer 'Base Layer' contains radio buttons. Unlike the checkboxes, only one radio button is selectable at a time.*

To remove displayed layer content from the map data frame, click on the checkbox in front of the layer name in the left panel. The layer names color is changed from blue to grey.

Hint: *If a group layer is unchecked, all contained layers are removed from the map data frame but keep their check marks.*

To expand a group layer, click on the plus sign behind the layer name in the left panel. All contained layers are shown in the left panel.

To shrink a group layer, click on the minus sign behind the layer name in the left panel. All contained layers are hidden from the left panel.

Hint: *Expanding and shrinking group layers has no effect on the data shown in the map data frame.*

To rearrange the layer order, click on the light blue bar behind a layer name in the left panel and drag it to the new position.

Hint: *Rearranging layers is only possible within the same level.*

To set layer transparency, click on the 'Toggle opacity slider' tool in the left panel to activate the transparency sliders in the left panel. Click and drag the control of a slider to the left to reduce the opacity of a layer in the map data frame.

Hint: *Once set, the layer transparency is kept, even if the sliders are hidden by another click on the 'Toggle opacity slider' tool.*

Gather information

To get information about a thematic layer, click on the 'Information …' button behind the layer name in the left panel. The corresponding layer information is displayed in the 'Layer-Info' tab.

To get information about map objects, select the 'Select map object' tool from the left panel and click on an object in the map data frame. The information is displayed in a popup dialog box in the map data frame. Additionally, a legend for the selected object is displayed.

To measure a distance, select the 'Measure distance' tool from the left panel. Click in the map data frame to start the measuring process. Double click to stop the measurement. A line is drawn in the map data frame with its length shown in a label next to it.

To delete measure lines, click on the 'Clear drawing layer' tool in the left panel. All drawn measure lines will be erased.

Hint: *Measure lines will also be erased by default, when leaving or refreshing the webpage.*

To get the geographic coordinates of an object, set the mouse pointer on the objects position. The geographic coordinates are displayed in the lower middle of the map data frame.

To get an overview over the region, click on the 'Overview map' button in the upper right of the map data frame. The Overview map window is opened and the current extent is displayed as a red rectangle.

To get additional information, click on the ‘Copyright’ button in the lower right of the map data frame to open the copyright information or switch to the ‘About’ tab to get information about the project, the project partners and the terms of use.

Reporting System

To add a new message point, click on the ‘Create new message point’ button in the right middle of the map data frame. The button turns from blue to green. Click at the position in the map data frame where the message is related to. The message box is opened. Enter the editor password and the message. Click on the ‘Save’ button. The new message point is now saved.

To show message point information, click on the ‘Select message point’ button in the right middle of the map data frame. The button color turns from blue to green. Click on a message point in the map data frame. The point color changes to blue. Click on the ‘Show/Delete message point’ button in the right middle of the map data frame. The message box is opened and the contained message readable. Click on the ‘Cancel’ button to close the message box.

To delete a message point, click on the ‘Select message point’ button in the right middle of the map data frame. The button color turns from blue to green. Click on a message point in the map data frame. The point color changes to blue. Click on the ‘Show/Delete message point’ button in the right middle of the map data frame. The message box is opened. Enter the editor password and click on the ‘Delete’ button. The message point is now deleted.

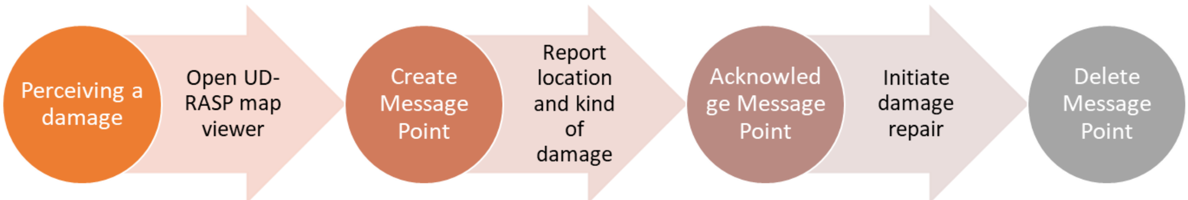
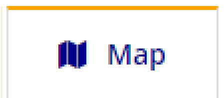
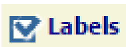
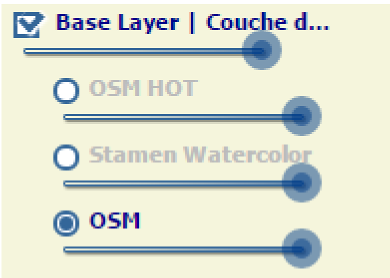


Figure 6: Reporting chain

1.2.3 Summary of tools and functionalities

Table 1: Tools and functionalities of the web information system

	Tool/Function	Description
	Tabs	
	Map	Click on the tab to show the map data frame
	Layer-Info	Click on the tab to show information about a selected layer
	About	Click on the tab to show information about the project, website and project partners

	Tool/Function	Description
Left Panel		
	Toggle opacity slider	Show or hide opacity sliders for all layers
	Opacity slider	Click and drag to the left for more transparency; Click and drag to the right for more opacity
	Zoom to rectangle	Click and drag a rectangle to zoom in to a specified extent
	Select map object	Click on an object to show its information and legend
	Zoom to full extent	Zoom out to 1:1.000 m
	Measure distance	Click in the map to start measuring; Double click to end a measure line
	Clear drawing layer	Delete all drawn measure lines
	Expand/shrink	Expand or shrink a group layer
	Up/down	Click and drag to rearrange layer order
	Information …	Click to switch to the Layer-Info tab
	Checkbox	Show or hide layer content in the map data frame
	Radio Button	Click to choose which layer of a group is shown in the map data frame, only one per group is allowed, OpenStreetMap (OSM) is default
Map data frame		
	Zoom slider	Click and drag to the top to zoom in (maximum scale 1:20 m); Click and drag to the bottom to zoom out (minimum scale 1:1000 m)
	Scale bar	Current map scale

	Tool/Function	Description
	Overview map	Show or hide the overview map
	Select message point	Click to activate, click on a message point to select it
	Show/delete message point	Show information of or delete a selected message point
	Create new message point	Click to activate, click in the map to add a new message point, enter editor password and a message
10.6482, 35.8019	Geographic coordinates	Coordinates of current mouse pointer position
	Copyright	Show or hide Copyright information

2 Data Source and Characteristics

Table 2: Overview of integrated data in the web system

Data	Description	Data Source
UDRASP geodatabase	Standardized geodatabase (AG Version 10.4.1) UDRASP_2018.gdb Additional Administration Coastal_Erosion FlashFlood Risk_Current_2018 Risk_Future_Scenario Risk_Other Urban FF_Hazard_1982_Brit FF_Hazard_2016_Brit FF_Hazard_HQ100_Brit UrbanGrowth_Prohabilistic_urban_Scenario_A UrbanGrowth_Prohabilistic_urban_Scenario_B UrbanGrowth_Prohabilistic_urban_Scenario_BaU UrbanGrowth_Prohabilistic_urban_Scenario_C UrbanGrowth_Prohabilistic_urban_Scenario_D UrbanGrowth_urban_P_Mon UrbanGrowth_urban_S_A__Mon UrbanGrowth_urban_S_B__Mon UrbanGrowth_urban_S_C__Mon UrbanGrowth_urban_S_D__Mon	Project UDRASP - IABG (contribution UNU-EHS and Municipality of Monastir) Status October 2018 – Additional: Municipality – Administration: Municipality – Coastal Erosion: IABG (Contribution APAL) – Flash Flood: IABG (contribution DHI-Wasy) – Risk (Current/ Future): UNU-EHS-EHS (contribution IABG, Municipality, INS) – Risk (Other): IABG (contribution, Municipality, Civil Protection, INS) Additional information of the provided layers are given in the “layer-Info”
Satellite Images	Satellite imagery of the Monastir region displayed as mosaic from “World View 3 (WV3)” data. Acquisition date: 05 March 2017. Ground Resolution: 0.3 m Baseline for visualization	EUSI - www.euspaceimaging.com
Base Layer	Open Street Map Open source data as base layer to particularly visualize the areas outside the Municipality	Open Street Map - www.openstreetmap.org