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D.2.5 - Geoprocessing infrastructure (Accompanying report)

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REVISION HISTORY AND STATEMENT OF ORIGINALITY

Revision History

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This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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1 List of references

Number	Full reference
1	i-locate deliverable D.1.4 – System Architecture. Available online from: http://www.i-locate.eu/public-deliverables/
2	i-Locate Portal Indoor/outdoor location and asset management through open geodata is available from: http://portal.i-locate.eu/

2 Table of Acronyms

Acronym	Description
CSV	Comma-Separated Values
XML	Extensible Markup Language
SHP	ESRI Shapefile
GML	Geography Markup Language
KML	Keyhole Markup Language
KMZ	Zipped KML files with a .kmz extension
XLS	Microsoft Excel file format
ODS	Operational Data Store
TSV	Tab-Separated Values
JSON	JavaScript Object Notation
GeoJSON	Open standard format for encoding collections of simple geographical features using JSON
PDF	Portable Document Format
RDF	Resource Description Framework
GDAL	Geospatial Data Abstraction Library
OGC	Open Geospatial Consortium
WMS	Web Mapping Service
WFS	Web Feature Service

3 Executive Abstract

The i-locate portal offers open access to indoor geospatial data, and the possibility to upload, edit, and download this data. In order to achieve this goal, a geoprocessing infrastructure has been developed as part of the portal, ready to be deployed and used whenever necessary.

Since the aforementioned services and components have been officially released as deliverable D.2.5 of type “Prototype” it has been decided to edit this report, as accompanying report, which provides a short description of the code developed.

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5 Components

5.1 Relation to portal as a whole

The geoprocessing infrastructure is an integral part of the portal and its components are used in the various functionalities as needed. Since the portal provides the means for the end users to import, export and transform geospatial data, there is no need for the geoprocessing components to be accessible directly or independently. Rather, the portal links together these components into easy to use workflows, so that the user can focus on the desired task.

5.2 Processing services relevant to the input phase

5.2.1 Shape File Loader

This service allows ESRI Shapefiles to be loaded into the portal. The shapefile loader layer has been developed using the Geotools library that provides support for reading and parsing of the shapefile format (commonly referred to as SHP). Each polygon from the data source is then inserted into the database, along with its 'name' property, and a reference to the map section which contains it. The shapefile loader is used to load the various sections of the indoor maps.

5.2.2 IndoorGML loader

Through this processing services IndoorGML XML files can be imported in the portal. The IndoorGML loader parses the input XML file and it generates an internal model. The internal model is then stored in the database. Although at the time of the release of this document the only implementation of the IndoorGML standard is the i-locate portal, this functionality is intended to be used to allow creation of indoor information with other tools, and to ensure interoperability between those tools that may become available in the future and the portal.

5.2.3 Geometrical and topological model checker

The portal allows creation and import of IndoorGML data for indoor navigation, as well as ESRI Shapefile format to be used for indoor maps. Before being published, these two data formats are validated against each other through a dedicated geoprocessing service, ensuring that navigation paths do not pass through walls, that some locations are not isolated from others, and so on. For this purpose, the IndoorGML graph and the Shapefile maps for a given section (building floor) are exported and packaged together, and sent to the topological model checker. The response of the model checker is stored together with the internal model, and publishing is only permitted if all the sections in a site are validated and have no errors.

5.3 Processing services relevant to the output phase

5.3.1 Shape File Exporter

ESRI Shapefiles can be exported from the portal through a dedicated processing service. The shapefile export service uses the Geotools library to deliver composition and writing of the shapefile format. Each polygon from the selected section in the database is then written, together with its 'name' property, to the resulting output file. This way, the shapefile exporter is used to export various sections of indoor maps.

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5.3.2 IndoorGML Exporter

A dedicated geoprocess allows IndoorGML files to be exported from the portal. The portal has an internal model corresponding to the IndoorGML structure, and the IndoorGML export services serializes this model, producing as output the most appropriate XML file. Each state and transition is then written, while tracking their corresponding IDs, connections and properties. The XML is used for export, or provided to the routing module in the i-locate toolkit.

5.3.3 IndoorGML json model

This service ensures that the IndoorGML internal model stored within the portal is converted to a JSON model that is then passed on to the OpenLayers library in order to facilitate display to and editing by the end user. The JSON model is limited in scope, containing simply the coordinates for states and transitions. This allows the in-browser editor to display the navigation graph, while making separate requests on-demand for the rest of the data, such as names, properties, interconnections, etc.

5.3.4 Map rendering

The map rendering is done by Geoserver. The Geoserver open source software contains a rendering engine that is used to transform database polygon data, read from shapefiles, into compressed bitmap image tiles, which are available through a web service. At this time this service is used by the Open Layers library to display maps in the browser and allow IndoorGML editing by the user. However, due to the open nature of Geoserver and usage of open standards such as WMS and WFS, this rendered map data could be used in the future for other applications without any intervention in the portal.

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6 Compatibility

The portal reads and writes IndoorGML version 1 data. Standard compliance is checked using the XML schemas provided by the OGC for this purpose, as at this time there are no other implementations of IndoorGML.

The portal reads and writes ESRI Shapefile data. Standard compliance is checked by using shapefiles generated with various other software tools and by loading data exported by the portal in other tools. The shapefile format is widely used and allows interoperation with a wide range of geospatial software.

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