



i-locate - Indoor/outdoor LOCation and Asset management Through open gEodata (GA 621040)

## COVER PAGE



# DELIVERABLE

**Project Acronym: i-locate**

**Grant Agreement number: 621040**

**Project Title: Indoor/outdoor LOCation and Asset management Through open gEodata**

## **D2.6 - Geospatial Database with other Portal Data (Accompanying report)**

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## REVISION HISTORY AND STATEMENT OF ORIGINALITY

### Revision History

Revision	Date	Author	Organisati	Description
v.0.1	25.06.2015	Lucian Brancovean	INDSOFT	Views and Column section added
v.0.2	26.06.2015	Lucian Brancovean	INDSOFT	Field Descriptions
v.0.3	26.06.2015	Catalin Popa	INDSOFT	Various updates and reformatting the text
v.1.0	30.06.2015	Giuseppe Conti	TRILOGIS	Final review and quality check

### Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise.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.

## 1 List of references

Number	Full reference
1	IndoorGML specification, OGC Specification. Available online at: <a href="http://www.opengeospatial.org/standards/indoorgml">http://www.opengeospatial.org/standards/indoorgml</a>
2	

## 2 Table of Acronyms

Acronym	Description
<b>IndoorGML</b>	Indoor Geography Markup Language
<b>ID</b>	Identifier
<b>QR Codes</b>	Scanable code images used for indoor localizing
<b>SRID</b>	ID of the reference system



### 3 Executive Abstract

This report illustrates the details of the geospatial database deployed for the i-locate portal. The portal contains and manages indoor data, both map data – layout of buildings, rooms and walls, and navigation data (i.e. IndoorGML graphs with states and transitions) that can be used to identify the accessible locations as well as possibility of motion between them. The portal also contains some auxiliary data, used to facilitate management of geospatial data.

The deliverable is technical in nature in that it provides in depth details of the different data models adopted within the database. This deliverable complements D.2.7 “The i-locate virtual hub” and D.2.8 “Mobile client and portal infrastructure documentation manuals”, which are other, more descriptive documents, providing high-level description of the portal and of the clients. These documents are all available from the project website ([www.i-locate.eu](http://www.i-locate.eu)).

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## 6 Table fields

The following sections detail the data structure of the various tables, starting from indoor mapping data structure, the moving on to indoor navigation data, as well as other auxiliary data. For table in the database a detailed description is provided.

### 6.1 Indoor mapping data

#### 6.1.1 Table: sites

Each given geographical site is made of a number of maps and data, which are in turn related to a single participant in the i-locate project. For example, each pilot may have one or several sites. Typically a site represents a building or a group of buildings, and it is visible within the portal as a standalone entity, displayed in a list of sites and as a marker on the map.

Each record in the table contains the definition of a site, with location and owner. Sites are created by users. The creator is the owner of the site, who is the only user who has the possibility to make changes to it. The owner may also delete a site. A site links together several map sections.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Name	Character(255)		Entered by user at creation.
Owner_id	Numeric (20,0)		The system marks the creator of the site as its owner.
location	Geometry(point,4326)		Coordinates of the site (latitude and longitude). The portal will display a marker on the world map at these coordinates, and zoom maps to this location when editing or previewing maps.

*Table 1: the database structure used for the "sites" table*

#### 6.1.2 Table: map\_section

A map section represents a floor of a building. Map sections belong to a site, and link together polygons stored as indoor\_line.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Name	Character (255)		User entered at creation time.
location	Geometry (polygon,4326)		Reserved for future use.



Map_level	Numeric (3,0)	-2 to 10  (can be extended in the future)	The building level that corresponds to this map section, if applicable (ignored for outline section).
Site_id	Numeric (20,0)		The Id of the site that this map section belongs to.
Stage	Character (100)	STAGING, PRODUCTION	STAGING denotes data that is being worked on, PRODUCTION denotes data that is published and cannot be edited.
Type	Character (100)	OUTLINE, ROOMS, WALLS	Only one OUTLINE section allowed per site.
Linked_section	Numeric (20,0)	Id of another map section, with type WALLS	ROOMS sections will have the Id of the corresponding walls section here. This is needed so that topological validation can take into account rooms and walls of a building floor together.

**Table 2: the database structure used for the "map\_section" table**

### 6.1.3 Table: indoor\_line

This table contains polygon data, the actual indoor geospatial data. All polygons composing a map section are stored in this table, with a link to the respective section. The data in this table is imported from shapefiles, exported to shapefiles, and exposed to Geoserver to be rendered as maps on screen for the user.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Location	Geometry(polygon, 4326)		Polygon geospatial data coming from shapefiles.
Map_id	Numeric (20,0)		Id of the containing map section.
Room_name	Character (500)	Human readable room names	For polygons denoting rooms, this field contains the room name property, which can be displayed on maps when rendered on screen. Outline and walls polygons ignore this field.

**Table 3: the database structure used for the "indoor\_line" table**

## 6.2 Indoor navigation data

### 6.2.1 Table: igml\_entity

All IndoorGML entities (layer, node, edge) have some common functionality made possible by this table. The main use is the association of arbitrary properties, through the igml\_property table.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.

*Table 4: the database structure used for the "igml\_entity" table*

### 6.2.2 Table: igml\_layer

Description: This table contains the IndoorGML layers belonging to a certain map section. Only ROOMS type sections may have IndoorGML layers. Then the layer represents a navigation graph through a building floor. Several different layers may be available for the same floor, distinguished by name. The system also tracks the status of a layer – whether it has been checked by the topological checker, and what the results of the check were. Only sections where all the layers are error-free can be published.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Name	Character (255)		User entered.
Status	Character (50)	UNKNOWN, PENDING, GOOD, WARNINGS, ERRORS	Assigned by system as a result of the topological checker being invoked for this layer.
Map_section_id	Numeric (20,0)	Id of a map section with ROOMS type	Id of the map section this layer belongs to.

*Table 5: the database structure used for the "igml\_layer" table*

### 6.2.3 Table: igml\_node

This table stores the definition of nodes within a layer, with or without an anchor linking the layer to another layer on a different level of the building. In this context, a node represents a location in the navigation graph, such as a room, a hallway, a door, stairs, an elevator, and so on and it corresponds to the IndoorGML concept of "state".

If the node is marked as an anchor it is linked to another node in a different layer belonging to a different section, allowing navigation between sections, or to and from different modes of transportation, outdoor maps, etc. An anchor node must have some property identifying the entity it is connected with in a different navigation graph.

A large space such as a large hall might contain several nodes.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Location	Geometry(point, 4326)		The geospatial coordinates of the node / state.
Layer_id	Numeric (20,0)		The Id of the layer this node belongs to.
Anchor	Boolean	True/False	Indicates whether this node is an anchor or not. By default nodes are not marked as anchors.

*Table 6: the database structure used for the "igml\_node" table*

#### 6.2.4 Table: igml\_edge

This table is used to store connections between two nodes from the igml\_node table. These connections are also called a transitions between states in IndoorGML. An edge signifies a possibility of movement between two nodes, such as going from one room to another, or going from one room to the door.

An edge must connect two nodes in the same layer. An edge must connect two existing nodes. If nodes are deleted, so must be the edges linking them, so that an edge will not have less than two nodes at any time. The order of the nodes is not considered important.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Node1_id	Numeric (20,0)		Id of one of the nodes.
Node2_id	Numeric (20,0)		Id of the other node.
Layer_id	Numeric (20,0)		Id of the layer this edge belongs to. Must be the same as the layer both nodes belong to.

*Table 7: the database structure used for the "igml\_edge" table*

#### 6.2.5 Table: igml\_property

This table stores the properties of a layer, with their defined values. All IndoorGML entities can have any number of arbitrary properties, represented by pairs of strings: name and value. The

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name property must be unique for an entity, that is two properties with the same name on the same object are not permitted. IndoorGML entities that can have properties are: layer, node, edge.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Entity_id	Numeric (20,0)		The Id of the entity this property belongs to.
Name	Character (255)		The name of the property.
Value	Character (255)		The value of the property.

*Table 8: the database structure used for the "igml\_property" table*

## 6.3 Auxiliary data

### 6.3.1 Table: users

This table contains the users that can access the portal. A user can be in an inactive state, for example after signing up but before being activated by the system administrator.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Username	Character (255)		A user name, used for logging in the portal.
Pass_hash	Character (255)		An SHA1 hash of the user's password.
Active	Boolean	True / False	Only if activated the user can actually log in the portal.
Email	Character (255)	Email address	An email address for this user.
Confirmation_code	Character (50)		A confirmation code that can be used for automatic activation.

*Table 9: the database structure used for the "users" table*

### 6.3.2 Table: site\_attachment

The portal allows attachment through the interface and retrieval via web service of arbitrary files, associated with a site. This table contains the file names, contents, and the respective owning site.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.

Name	Character (255)		File name.
File	Byte array		File contents, binary.
Site_id	Numeric (20,0)		The Id of the site that has this file attached.

**Table 10: the database structure used for the "site\_attachment" table**

### 6.3.3 Table: qr\_codes

This table is used to store the definition and location of a QR code. QR codes can be defined for locations in a site, printed, and used as a basic positioning system. The portal facilitates the definition on QR-identified locations. For each QR code defined in the interface, a record is stored in this table, with the geospatial coordinates of the location, a name and a description. This allows the portal to offer a service that provides the coordinates of a given QR code when scanned. It is also possible to move a QR code to a different location, without reprinting it.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Site_id	Numeric (20,0)		The Id of the site that owns this QR code.
Location	Geometry (point,4326)	2D point coordinates	The 2D spatial coordinates of the QR code.
Level	Numeric (2,0)	-2 to 10	The building level where this QR code resides.
Name	Character (50)		A name that is displayed when printing a QR code.
Description	Character (1024)		A description that is displayed when printing a QR code.

**Table 11: the database structure used for the "qr\_codes" table**

### 6.3.4 Table: layer\_error

This table stores error types for layer definition. IndoorGML layers must be checked with the geometrical and topological model checker. The checks that are performed are described in the portal manual. After a check, the result may contain some errors and warnings. This table stores these errors and warnings to allow user review. The error messages are stored as human readable strings.

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.

Error	Character (255)		Error description text.
Layer_id	Numeric (20,0)		Id of the layer that has this error.
Title	Character (50)		A short title for the error.
Type	Character (50)	WARNING, ERROR	Error type.

*Table 12: the database structure used for the "layer\_error" table*

## 7 Views and Columns

### 7.1 View: geography\_columns

Field Name	Type	Possible Values	Comments
f_table_catalog	Character()		
f_table_schema	Character()		
f_table_name	Character()		
f_geography_column	Character()		
coord_dimension	Integer		
srid	Numeric (20,0)		
type	Character()		

*Table 13: the view used for the "geography\_columns"*

### 7.2 View: production

This view displays the rooms in the production version of the map

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Location	Geometry (point,4326)	2D point coordinates	The 2D spatial coordinates from the shape file.
Room_name	Character (500)	Human readable room names	For polygons denoting rooms, this field contains the room name property, which can be displayed on maps when rendered on screen. Outline and walls polygons ignore this field.
Map_level	Numeric (3,0)	-2 to 10 (can be extended in the future)	The building level that corresponds to this map section, if applicable (ignored for outline section).

*Table 14: the view used for the "production"*

### 7.3 View: production\_o

This view displays the outline in the production version of the map

Field Name	Type	Possible Values	Comments
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Id	Numeric (20,0)		System generated.
Location	Geometry (point,4326)	2D point coordinates	The 2D spatial coordinates from the shape file.
Map_level	Numeric (3,0)	-2 to 10 (can be extended in the future)	The building level that corresponds to this map section, if applicable (ignored for outline section).

*Table 15: the view used for the "production\_o"*

## 7.4 View: production\_w

This view displays the walls in the production version of the map

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Location	Geometry (point,4326)	2D point coordinates	The 2D spatial coordinates from the shape file.
Room_name	Character (500)	Human readable room names	For polygons denoting rooms, this field contains the room name property, which can be displayed on maps when rendered on screen. Outline and walls polygons ignore this field.
Map_level	Numeric (3,0)	-2 to 10 (can be extended in the future)	The building level that corresponds to this map section, if applicable (ignored for outline section).

*Table 16: the view used for the "production\_w"*

## 7.5 View: raster\_columns

Field Name	Type	Possible Values	Comments
r_table_catalog	Character()		
r_table_schema	Character()		
r_table_name	Character()		
r_raster_column	Character()		
srid	Numeric()		
scale_x	Numeric()		



scale_y	Numeric()		
blocksize_x	Numeric()		
blocksize_y	Numeric()		
same_alignment	Boolean		
regular_blocking	Boolean		
num_bands	Integer		
pixel_types	Character		
nodata_values	Integer		
out_db	Boolean		
extent	Geometry		

*Table 17: the view used for the "raster\_columns"*

## 7.6 View: raster\_overviews

Field Name	Type	Possible Values	Comments
o_table_catalog	Character()		
o_table_schema	Character()		
o_table_name	Character()		
o_raster_column	Character()		
r_table_catalog	Character()		
r_table_schema	Character()		
r_table_name	Character()		
r_raster_column	Character()		
overview_factor	Integer		

*Table 18: the view used for the "raster\_overviews"*

## 7.7 View: staging

This view displays the rooms in the staging version of the map

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Location	Geometry	2D point	The 2D spatial coordinates from the

	(point,4326)	coordinates	shape file.
Room_name	Character (500)	Human readable room names	For polygons denoting rooms, this field contains the room name property, which can be displayed on maps when rendered on screen. Outline and walls polygons ignore this field.
Map_level	Numeric (3,0)	-2 to 10 (can be extended in the future)	The building level that corresponds to this map section, if applicable (ignored for outline section).

**Table 19: the view used for the "staging"**

## 7.8 View: staging\_o

This view displays the outline in the staging version of the map

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Location	Geometry (point,4326)	2D point coordinates	The 2D spatial coordinates from the shape file.
Map_level	Numeric (3,0)	-2 to 10 (can be extended in the future)	The building level that corresponds to this map section, if applicable (ignored for outline section).

**Table 20: the view used for the "staging\_o"**

## 7.9 View: staging\_w

This view displays the walls in the staging version of the map

Field Name	Type	Possible Values	Comments
Id	Numeric (20,0)		System generated.
Location	Geometry (point,4326)	2D point coordinates	The 2D spatial coordinates from the shape file.
Room_name	Character (500)	Human readable room names	For polygons denoting rooms, this field contains the room name property, which can be displayed on maps when rendered on screen. Outline and walls polygons ignore this field.

Map_level	Numeric (3,0)	-2 to 10 (can be extended in the future)	The building level that corresponds to this map section, if applicable (ignored for outline section).
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*Table 21: the view used for the "staging\_w"*