Annex 1

UnderSafe web page www.undersafe.eu

Undersafe videos:

http://www.youtube.com/watch?v=2tkAPiSD1eM
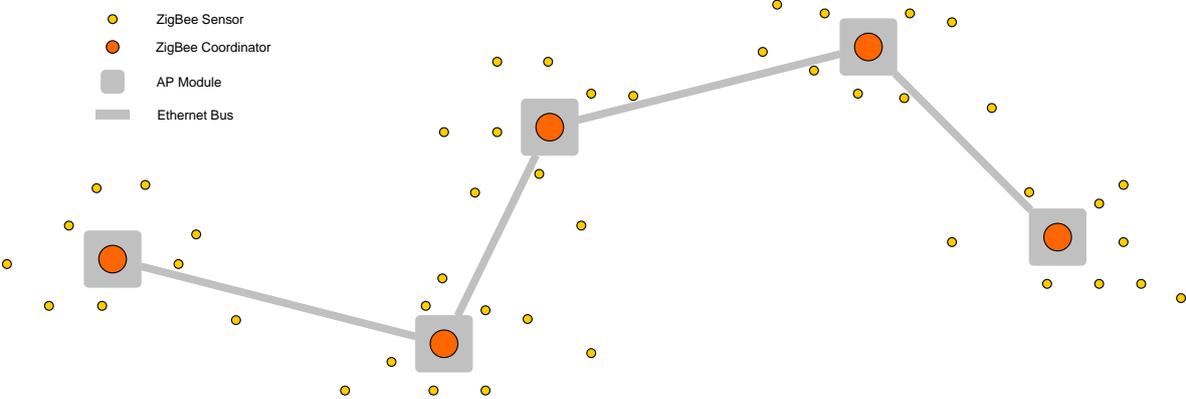
http://www.youtube.com/watch?v=DEjJ-RZ8pSI
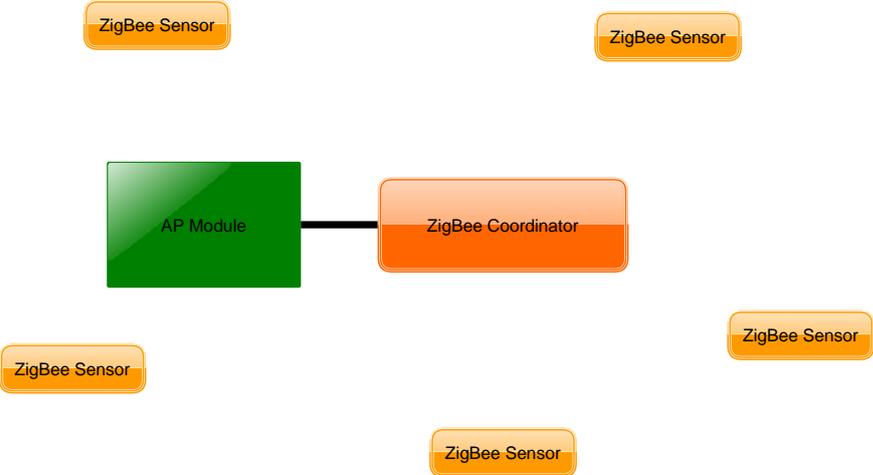
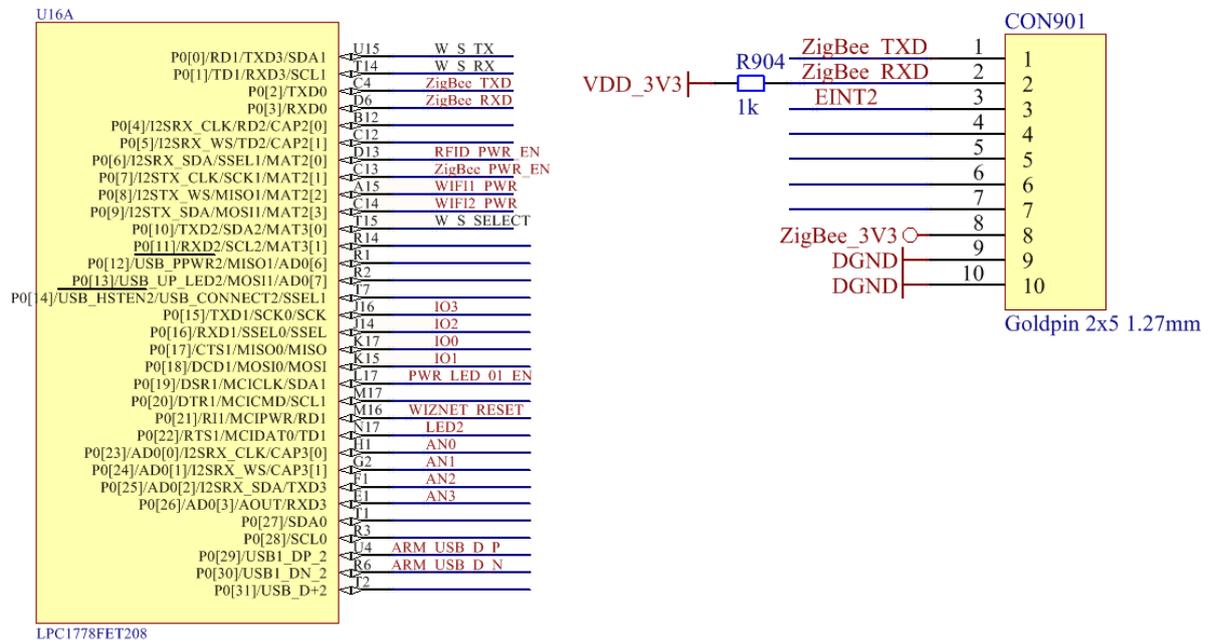## Figures and tables.

Figure 1 The system topology
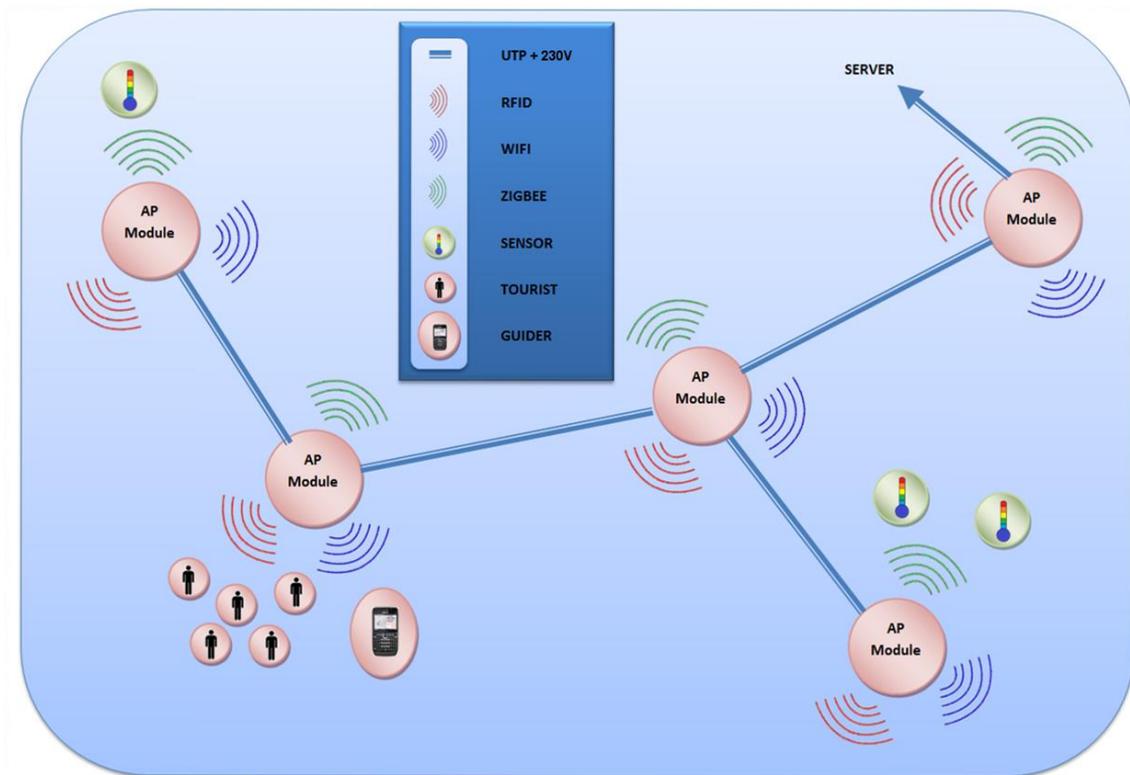
Figure 2: Overall place of ZigBee sensor system in the project

Figure 3: Block diagram of the sensor system

Figure 4: ZigBee part on the AP Module board
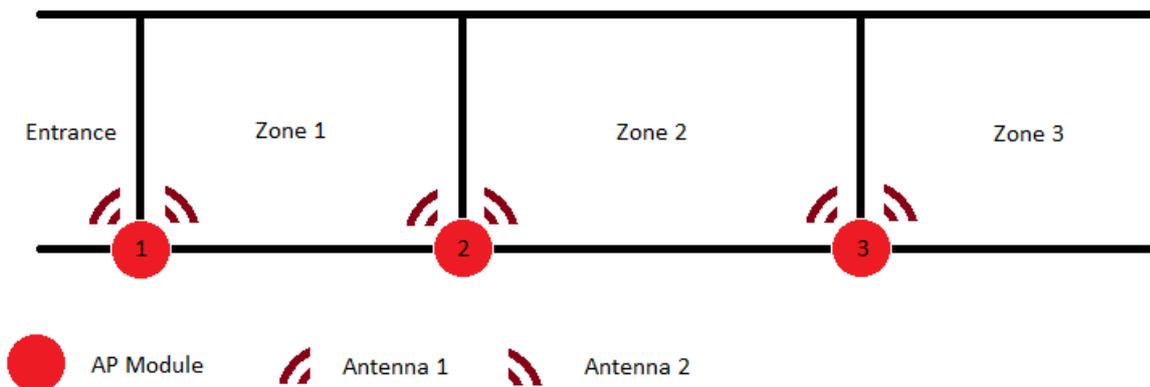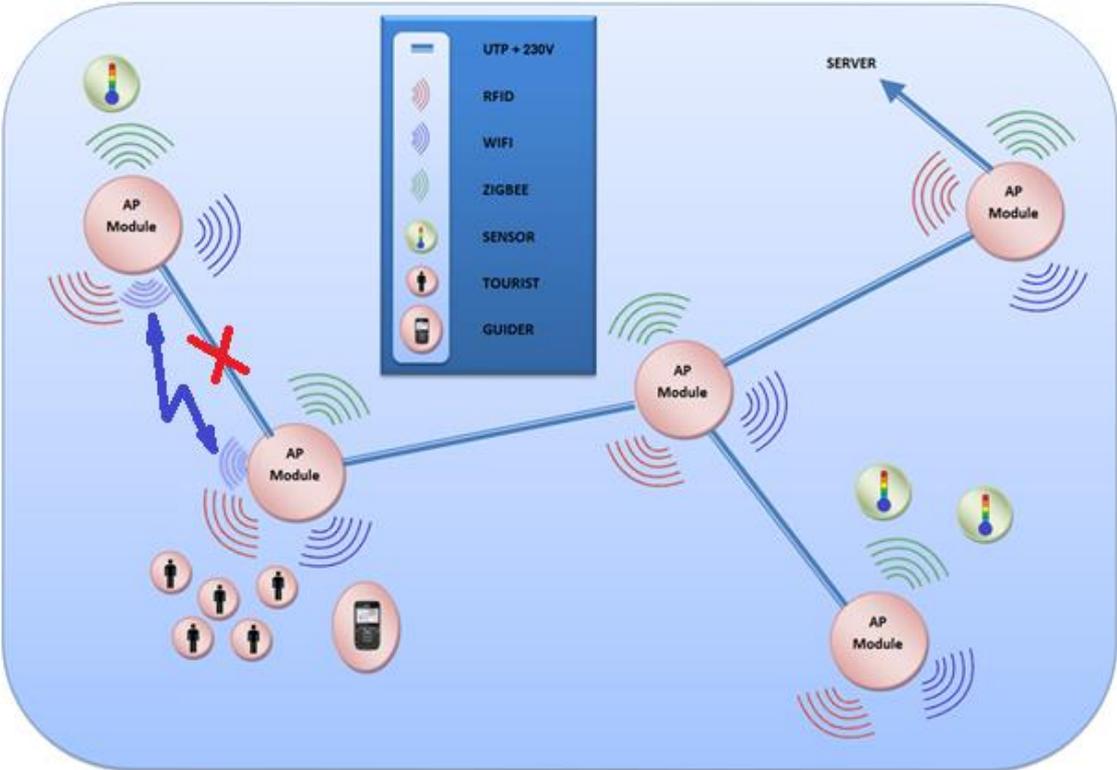

Fig. 5: Location system principle

Fig. 6: Calculation of the number of persons within a zone.

Figure 7 - emergency WiFi connection
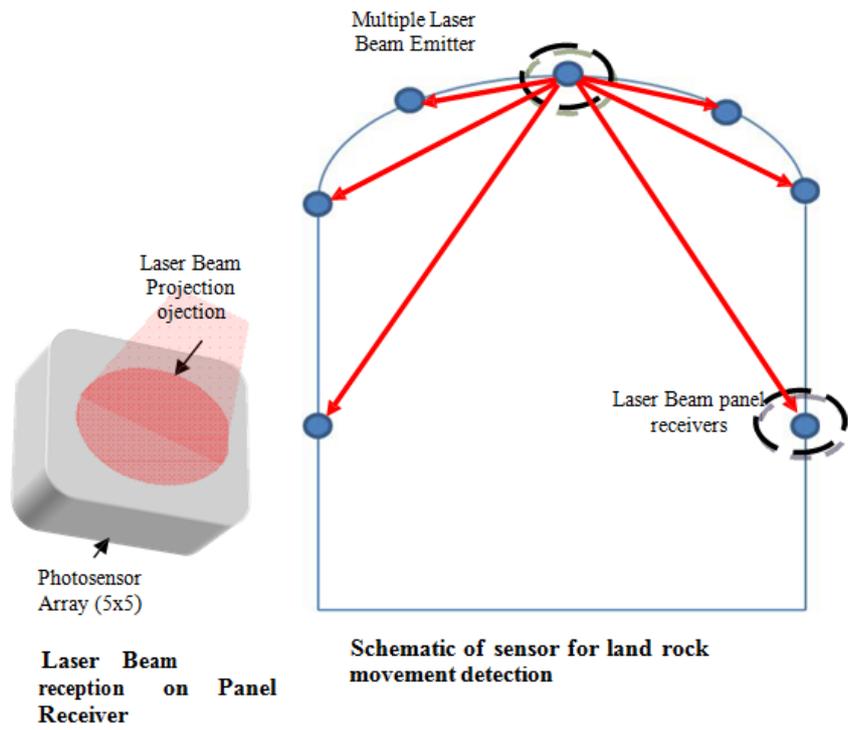
Figure 8 - sensor scheme

Multiple Laser
Beam Emitter

Laser Beam
Projection
ojection

Photosensor
Array (5x5)

Laser Beam panel
receivers

Laser Beam reception on Panel Receiver

Schematic of sensor for land rock movement detection

Figure 9 - flow chart

```
                    ( START )
                        │
    ┌───────────────────┼────────────────────────────────────┐
    │                   ▼                                      │
    │         ┌──────────────────────┐                        │
    │         │  TX: GO TO SLEEP...   │                        │
    │         └──────────────────────┘                        │
    │                   │                                      │
    │                   ▼                                      │
    │         ┌──────────────────────┐                        │
    │         │  RX: GO TO SLEEP...   │                        │
    │         └──────────────────────┘                        │
    │                   │                                      │
    │                   │         ┌──────────┐                 │
    │                   ▼         │          │                 │
    │              ╱─────────╲    │                            │
    │             ╱  TX: END   ╲ N│                            │
    │             ╲ OF SLEEP ? ╱──┘                            │
    │              ╲─────────╱                                 │
    │                   │ Y                                    │
    │                   ▼                                      │
    │         ┌──────────────────────┐                        │
    │         │ TX to AP: Start       │                        │
    │         │ measuring!            │                        │
    │         └──────────────────────┘                        │
    │                   │                                      │
    │                   ▼                                      │
    │         ┌──────────────────────┐                        │
    │         │  TX: LASER FLASH      │                        │
    │         └──────────────────────┘                        │
    │                   │                                      │
    │                   ▼                                      │
    │         ┌──────────────────────┐                        │
    │         │  TX: GO TO SLEEP...   │                        │
    │         └──────────────────────┘                        │
    │                   │                                      │
    │                   ▼                  N                    │
    │              ╱─────────╲────────────────┐                │
    │             ╱  LASER ON  ╲               ▼                │
    │             ╲  TARGET?   ╱          ╱─────────╲  N        │
    │              ╲─────────╱           ╱ AP: TIME  ╲──┐       │
    │                   │ Y              ╲   UP ?    ╱  │       │
    │                   ▼                 ╲─────────╱◄──┘       │
    │         ┌──────────────────────┐         │ Y             │
    │         │   RX: WAKE UP!        │         ▼               │
    │         └──────────────────────┘  ┌─────────────────┐    │
    │                   │               │ AP: LASER SENSOR │   │
    │                   ▼               │ ALARM!          │   │
    │         ┌──────────────────────┐  └─────────────────┘    │
    │         │ RX to AP: LASER       │        │               │
    │         │ DETECTED!             │        └───────────────┤
    │         └──────────────────────┘                        │
    │                   │                                      │
    │                   ▼                                      │
    │         ┌──────────────────────┐                        │
    │         │  RX: GO TO SLEEP...   │                        │
    │         └──────────────────────┘                        │
    │                   │                                      │
    │                   ▼                                      │
    │         ┌──────────────────────┐                        │
    │         │ AP: LASER SENSOR OK   │                        │
    │         └──────────────────────┘                        │
    │                   │                                      │
    └───────────────────┘                                      
```
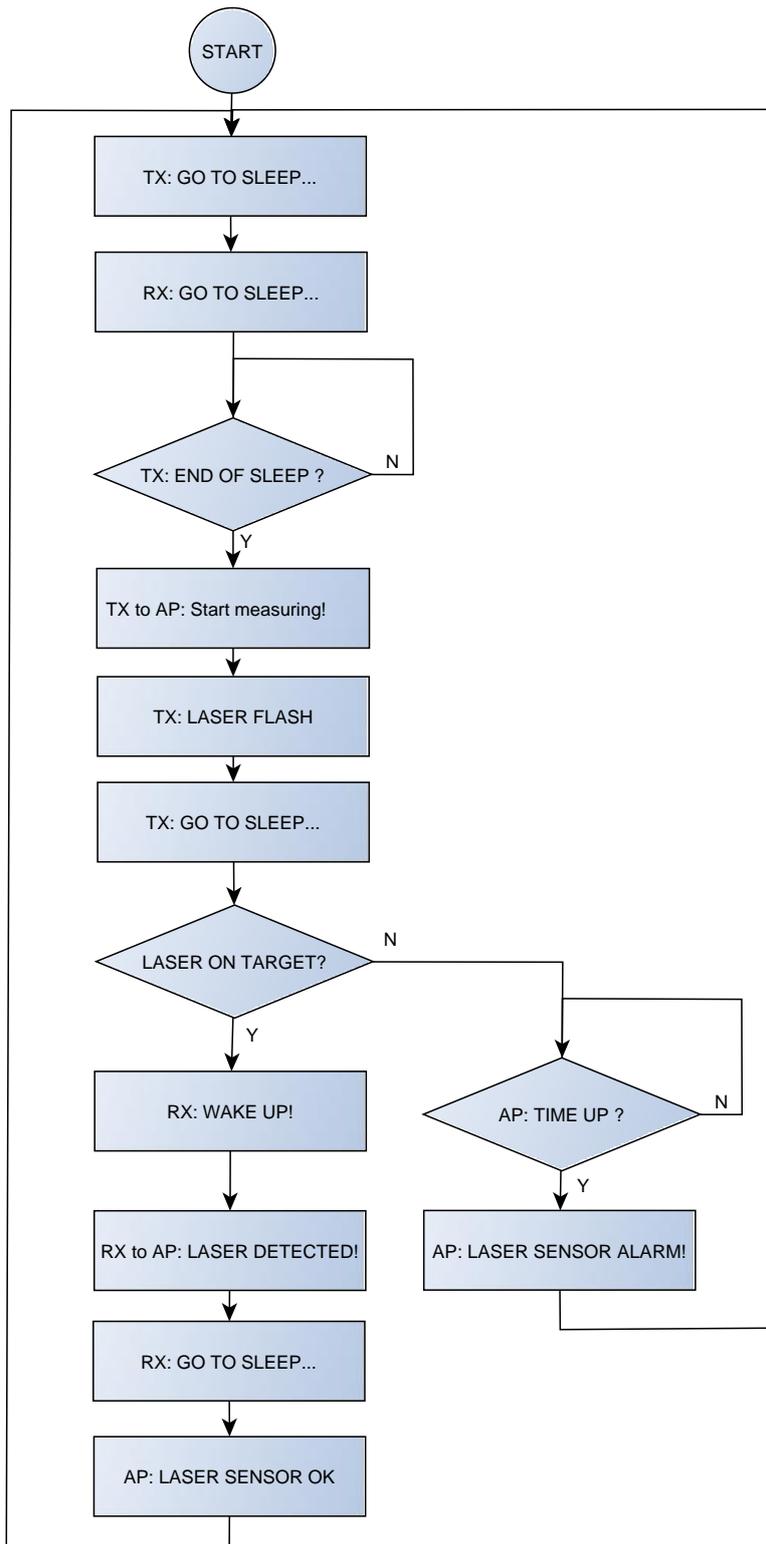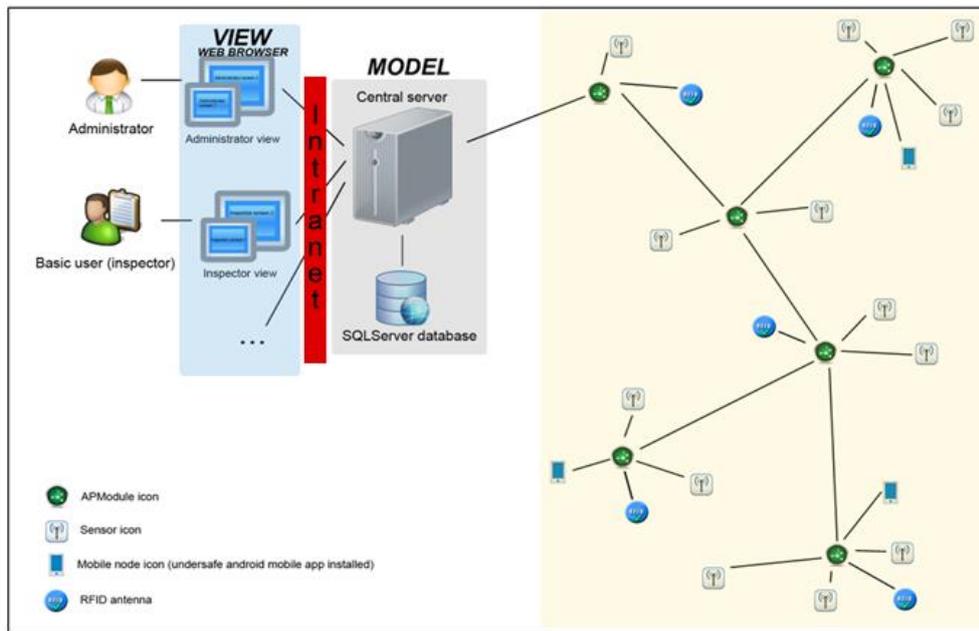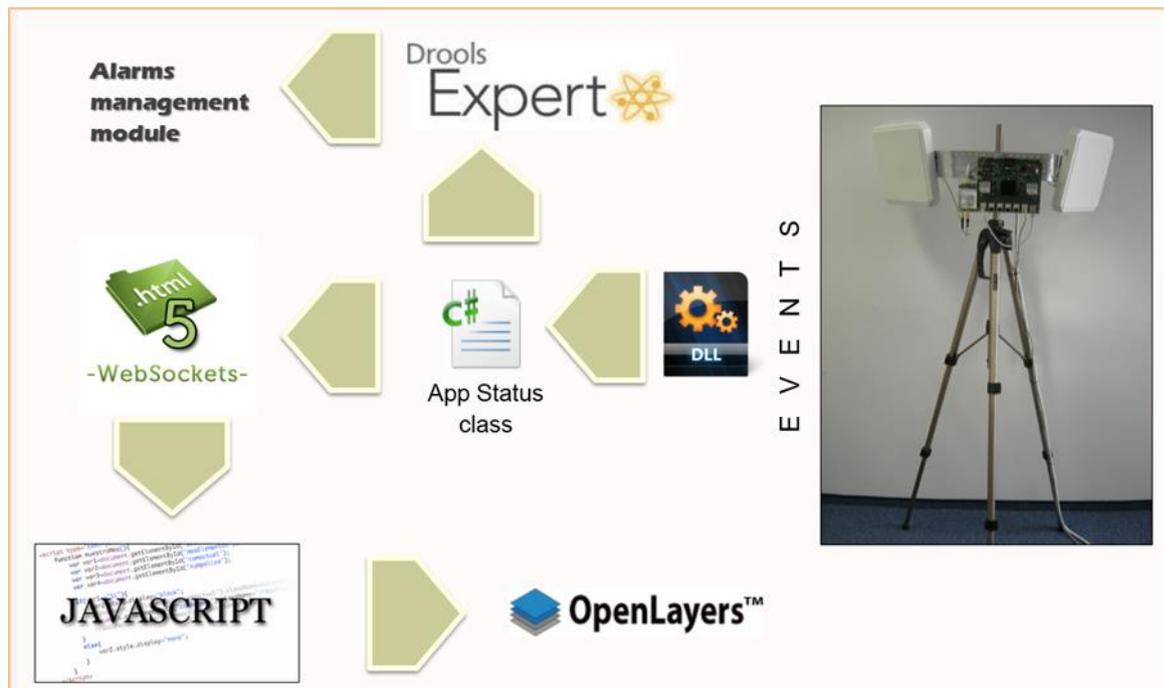
Fig. 10: Final architecture of the UnderSafe system.

Fig. 11: Processing path of the AP modules data.

Table 1

Variable	Name	Comments
Temperature.	TEMP	Current temperature.
Relative humidity.	RHUM	Current relative humidity.
Water level.	WATR	Control of the water level in lakes and rivers.
Light sensor.	LIGH	Current light level.
Noise level.	NOIS	Current noise level.
CO2 level.	CO2	Current CO_2 level.
CO level.	CO	Current CO level.
SH2 level.	SH2	Current SH_2 level.
CH4 detected.	CH4	Presence of CH_4 detected.
Smoke detected.	SMKE	Presence of smoke detected.
Rock falling detected.	ROCK	Detection of a fallen rock.
Landslide detected.	LDSD	Detection of a landslide.

Table 2

Keyword	Initial	Value	Usage
NAME	N	Provides the name for the rule generated from that row. The default is constructed from the text following the RuleTable tag and the row number.	At most one column.
DESCRIPTION	I	A text, resulting in a comment within the generated rule.	At most one column.
CONDITION	C	Code snippet and interpolated values for constructing a constraint within a pattern in a condition.	At least one per rule table.
ACTION	A	Code snippet and interpolated values for constructing an action for the consequence of the rule.	At least one per rule table.
METADATA	@	Code snippet and interpolated values for constructing a metadata entry for the rule.	Optional, any number of columns.

Table 3

Name	Type	Parameters	Usage
Code	CONDITION	String	Code of the zone affected by this rule.
Minimum temperature	CONDITION	Number	Activated when temperature is below the given parameter.
Maximum temperature	CONDITION	Number	Activated when temperature is above

			the given parameter.
Minimum relative humidity	CONDITION	Number	Activated when relative humidity is below the given parameter.
Maximum relative humidity	CONDITION	Number	Activated when relative humidity is above the given parameter.
Minimum water level	CONDITION	Number	Activated when relative humidity is below the given parameter.
Maximum water level	CONDITION	Number	Activated when water level is above the given parameter.
Rock falling detected	CONDITION	Boolean	If selected, condition is activated when rock falling is detected.
Landslide detected	CONDITION	Boolean	If selected, condition is activated when landslide is detected.
Minimum light	CONDITION	Number	Activated when light level is below the given parameter.
Smoke detected	CONDITION	Boolean	If selected, condition is activated when smoke is detected.
Maximum noise	CONDITION	Number	Activated when noise level is above the given parameter.
Maximum CO2	CONDITION	Number	Activated when CO_2 level is above the given parameter.
Maximum CO	CONDITION	Number	Activated when CO level is above the given parameter.
Maximum SH2	CONDITION	Number	Activated when SH_2 level is above the given parameter.
Minimum O2	CONDITION	Number	Activated when O_2 level is below the given parameter.
CH4 detected	CONDITION	Boolean	If selected, condition is activated when CH_4 gas is detected.
THEN CLAUSE (Type, Code,	ACTION	{Any Database alarm type such as Warning or Danger}, <Any DataBase alarm code such as	The result of the rule activation.

Description)		MIN_TEMP or MAX_TEMP>, <Additional text describing or clarifying this rule activation. It will be shown in the when all conditions got activated.>	

Fig. 12: Separation from guider example situation.
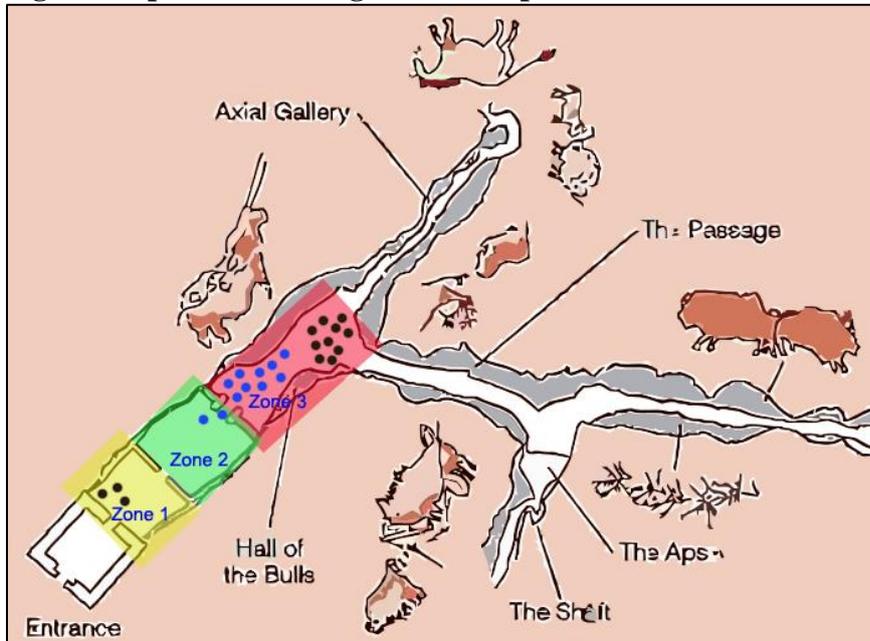
Fig. 13: OpenLayers and UnderSafe technology, working together.

Fig. 14: SVG format and OpenLayers allow an interactive and powerful result where pixels cannot be noticed even with the maximum zoom level.
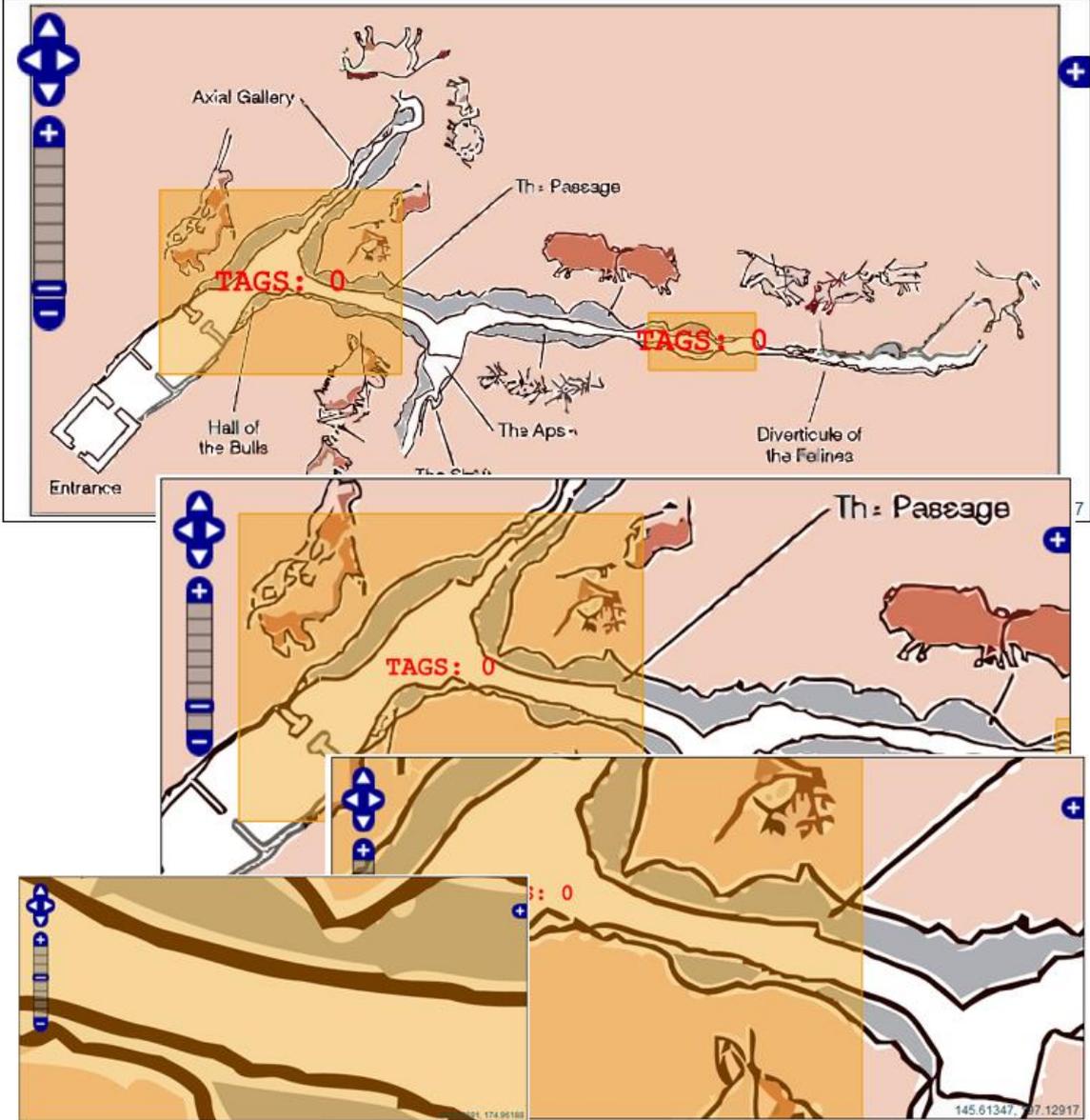
Fig. 15: UnderSafe login screen.

Fig. 16: Four layers at charge of the roles policy.
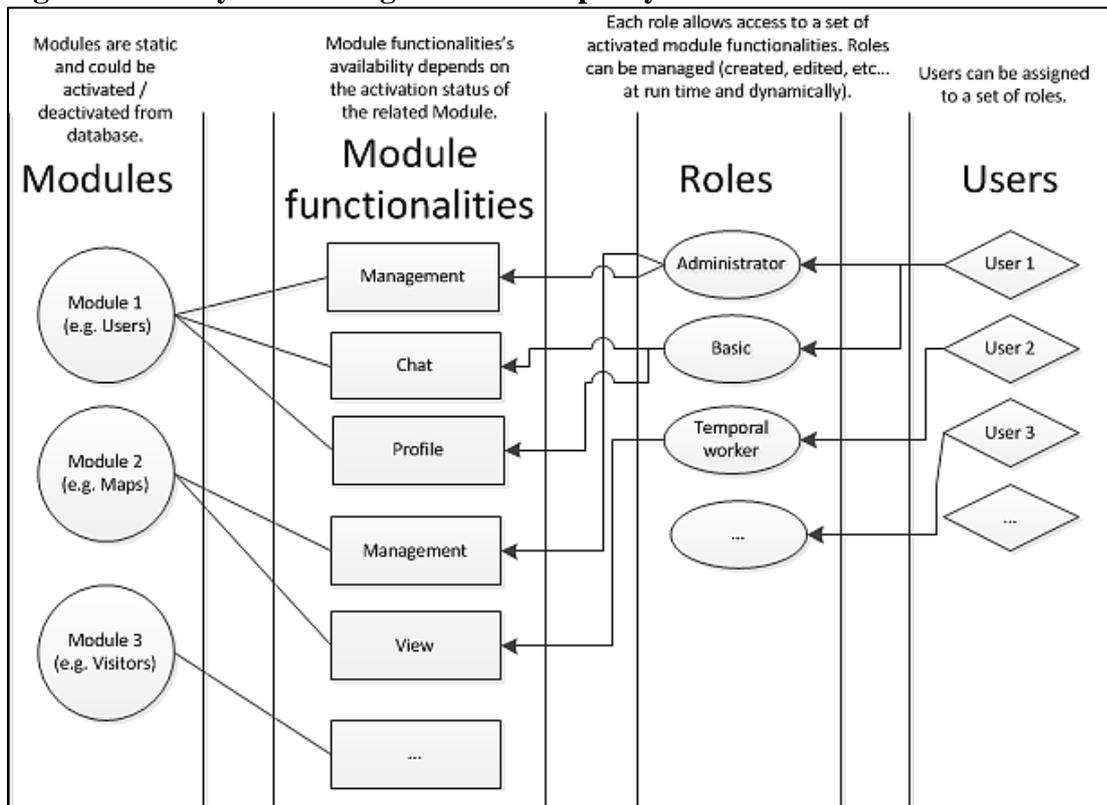
Fig. 17: Available functionalities depending on the role policy.
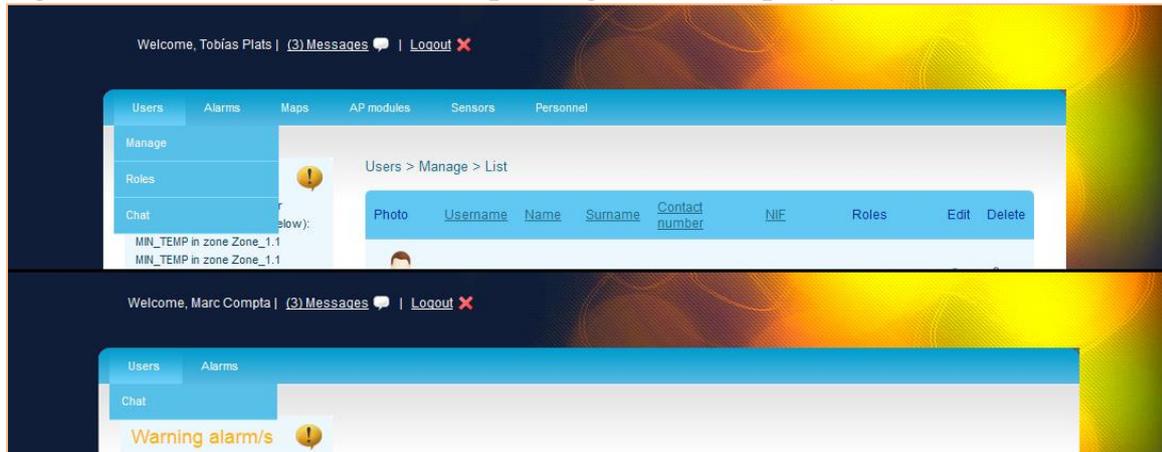
Fig. 18: UnderSafe main interface schema.
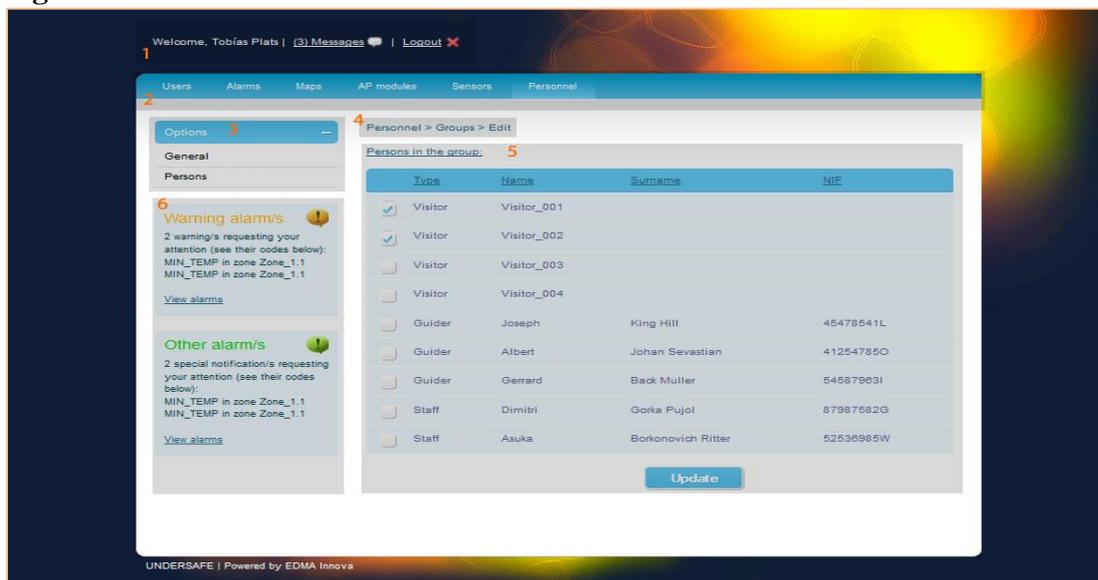
Fig. 19: Message confirming a database commit.

Fig. 20: Profile screen.

Fig. 21: Users list view.

Fig. 22: Users edit view.

Fig. 23: Users add view.
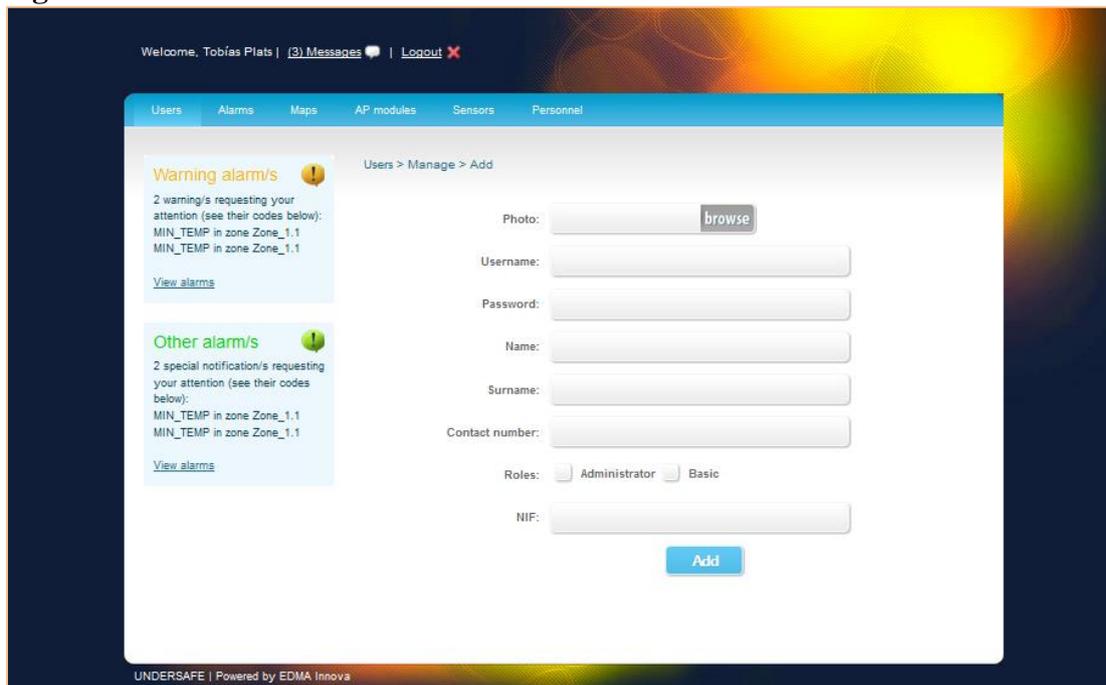
Fig. 24: Roles list view (up) and Roles edit view (bottom)
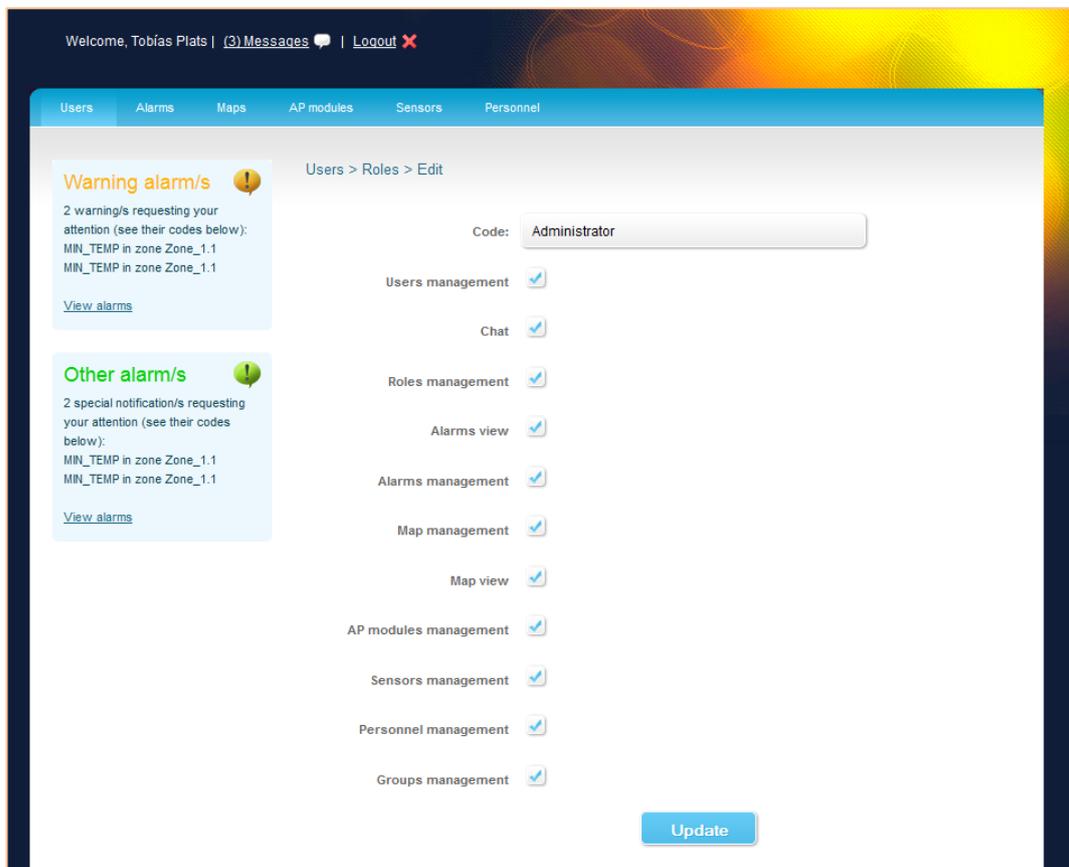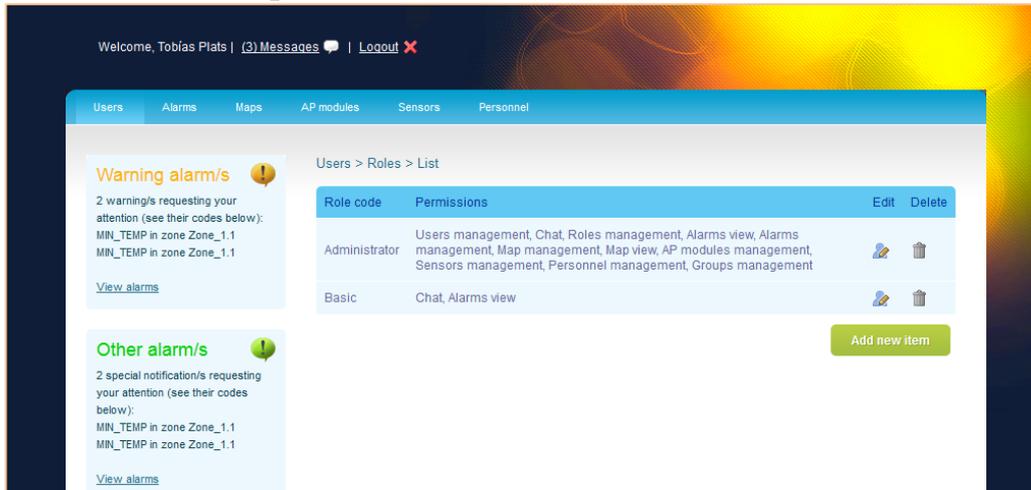
Fig. 25: Live chat.
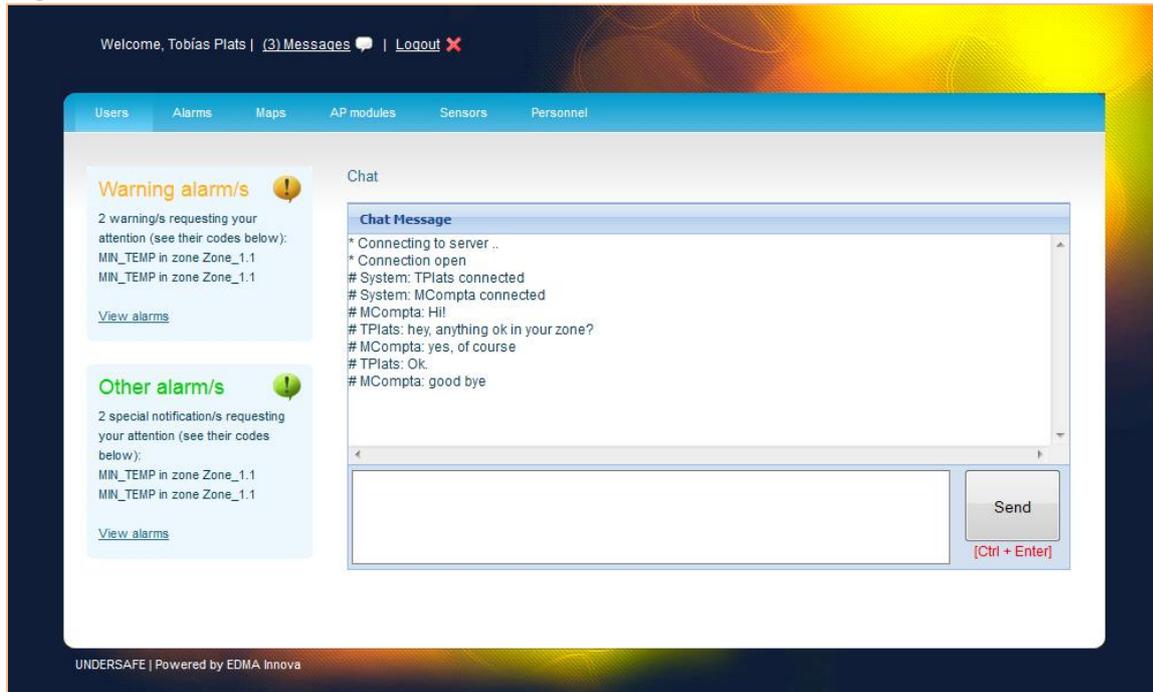
Fig. 26: Live chat log, configuration screen.
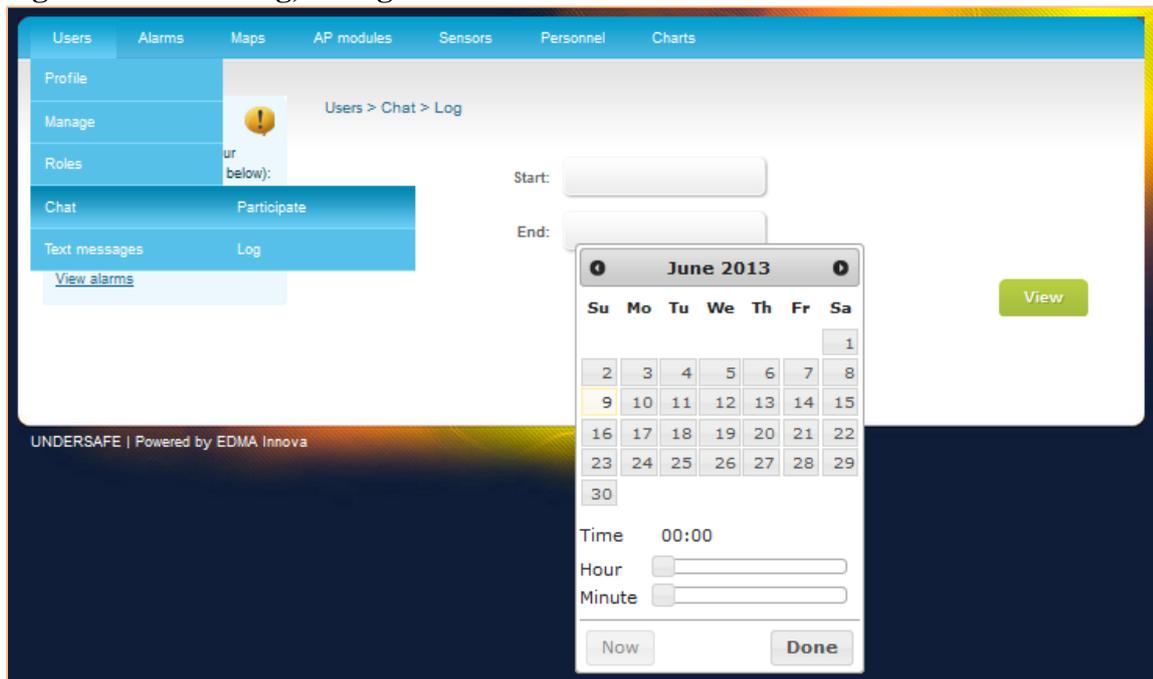
Fig. 27: Live chat log, view screen.
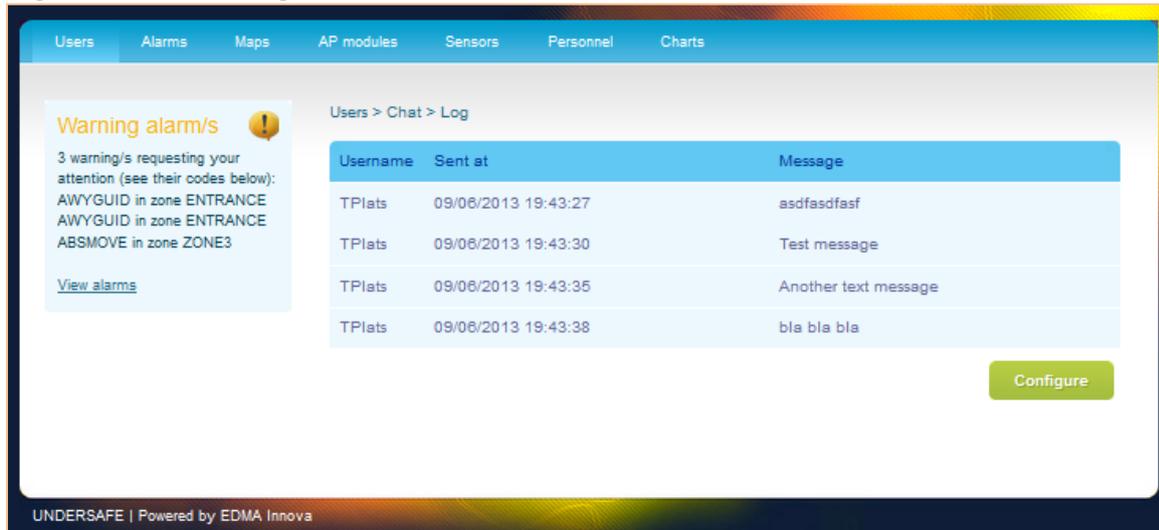
Fig. 28: New private text message functionality.
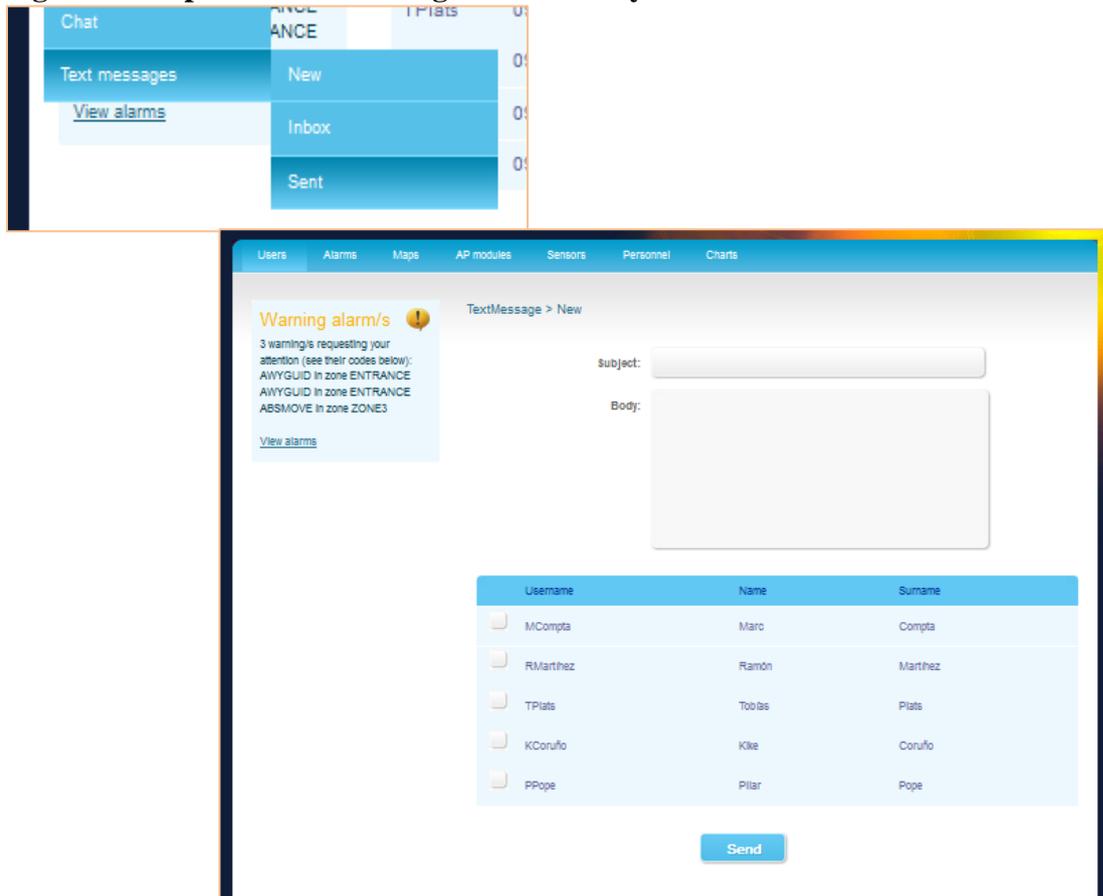
Fig. 29: Text messages inbox.
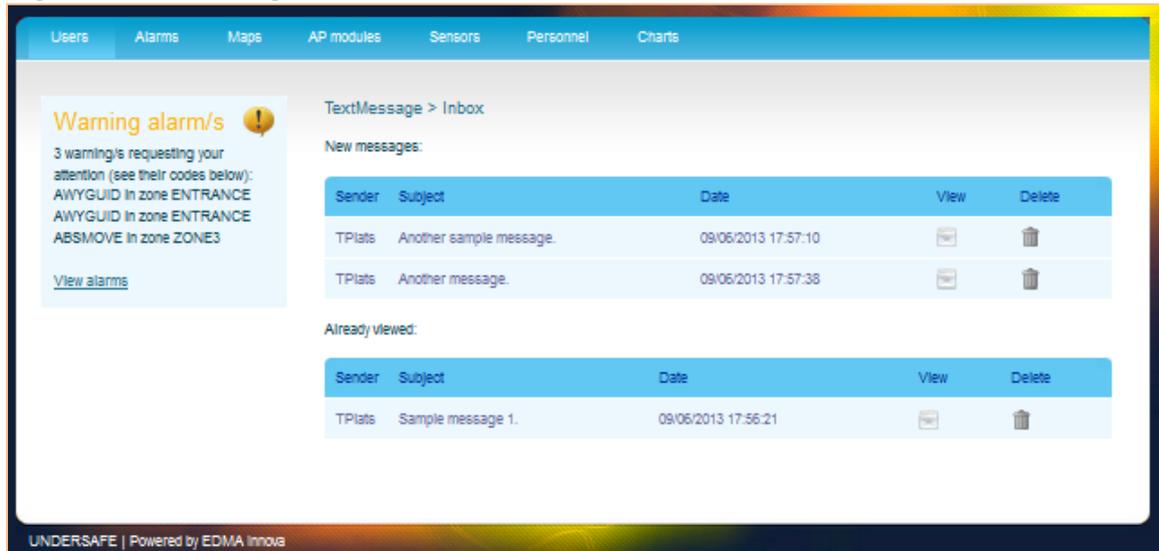
Fig. 30: Received message detail.
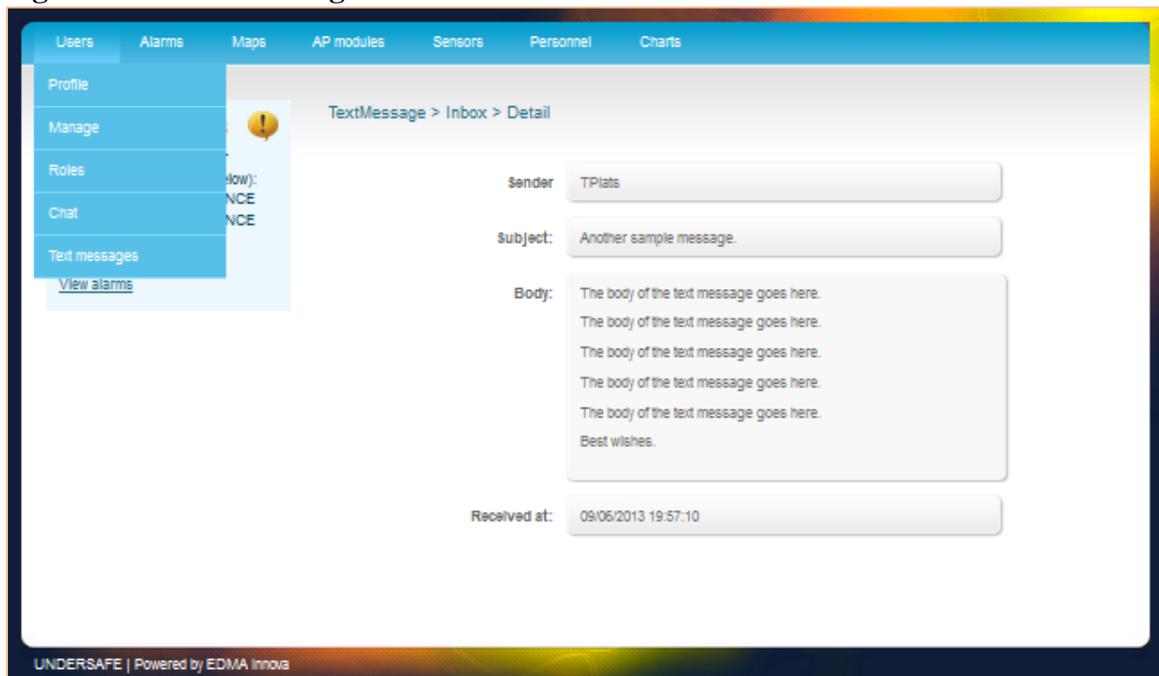
Fig. 31: Sent message detail.
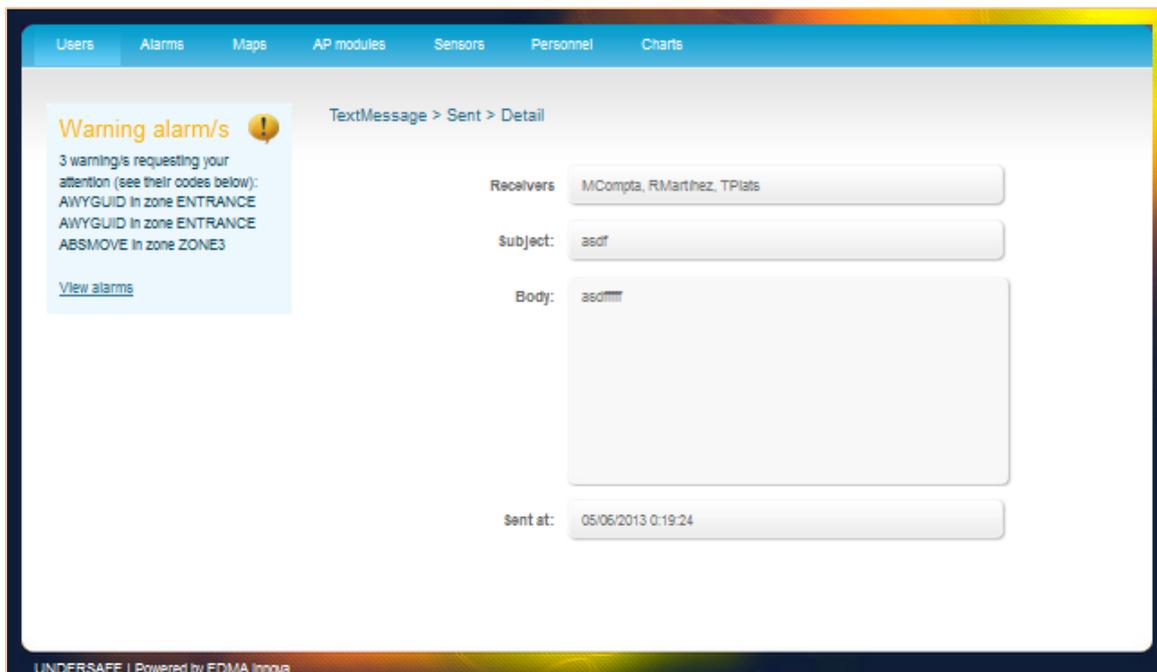
Fig. 32: New received messages notification.
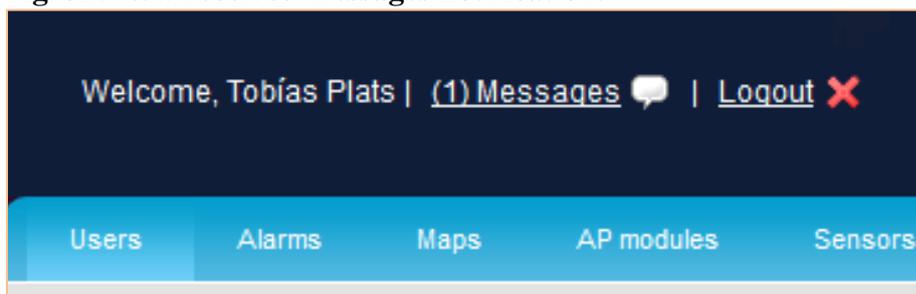
Fig. 33: Alarms log configuration screen to retrieve alarms based on a time interval.

Fig. 34: Alarms list view.

Fig. 35: Alarms edit view.

Fig. 36: Alarms status list view.
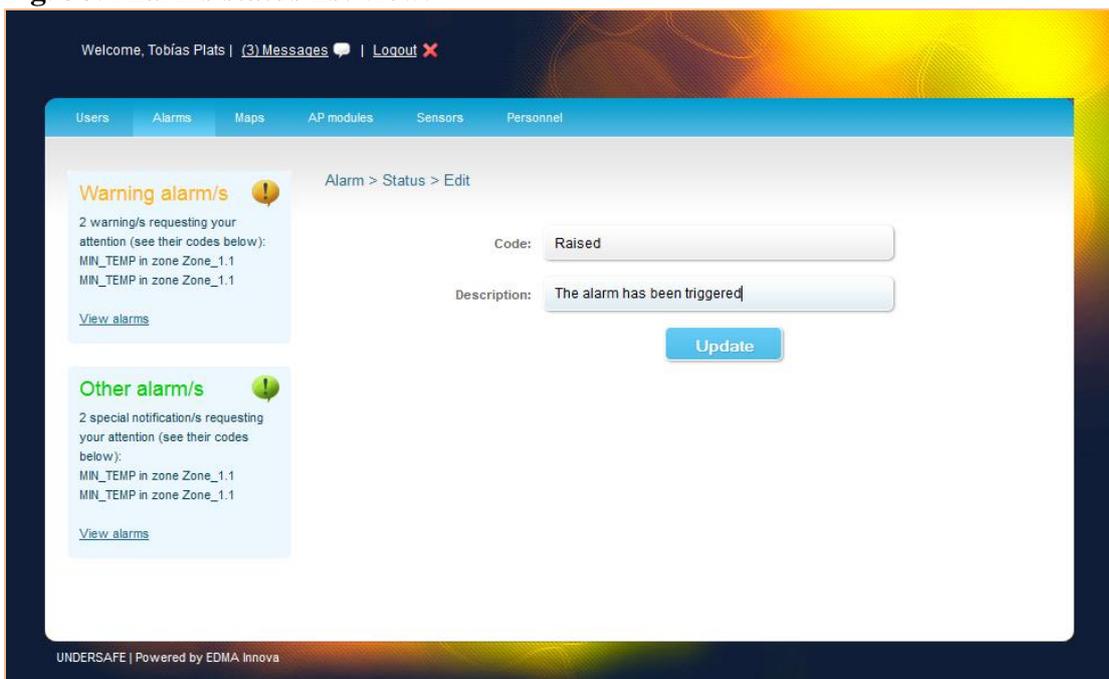
Fig. 37: Alarms statuses edit view.
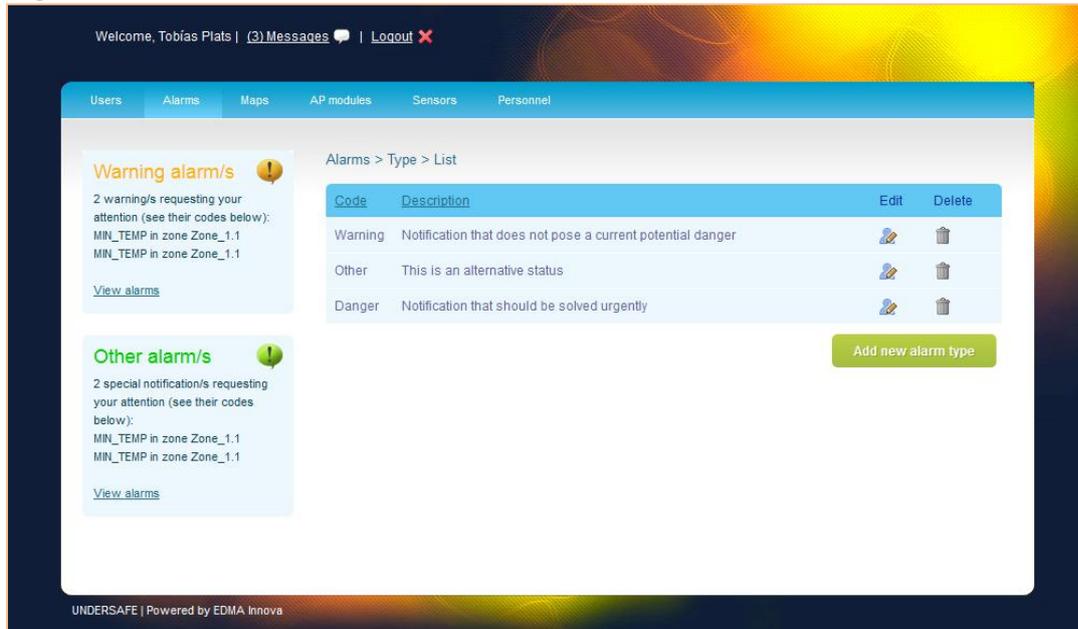
Fig. 38: Alarms types list view.
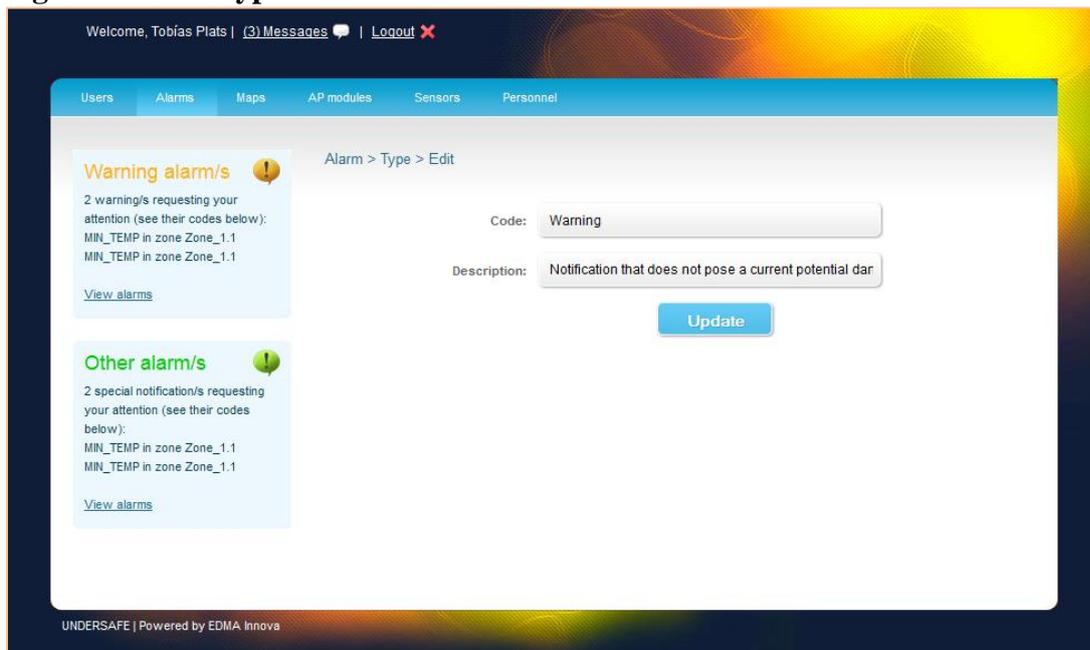
Fig. 39: Alarms types edit view.
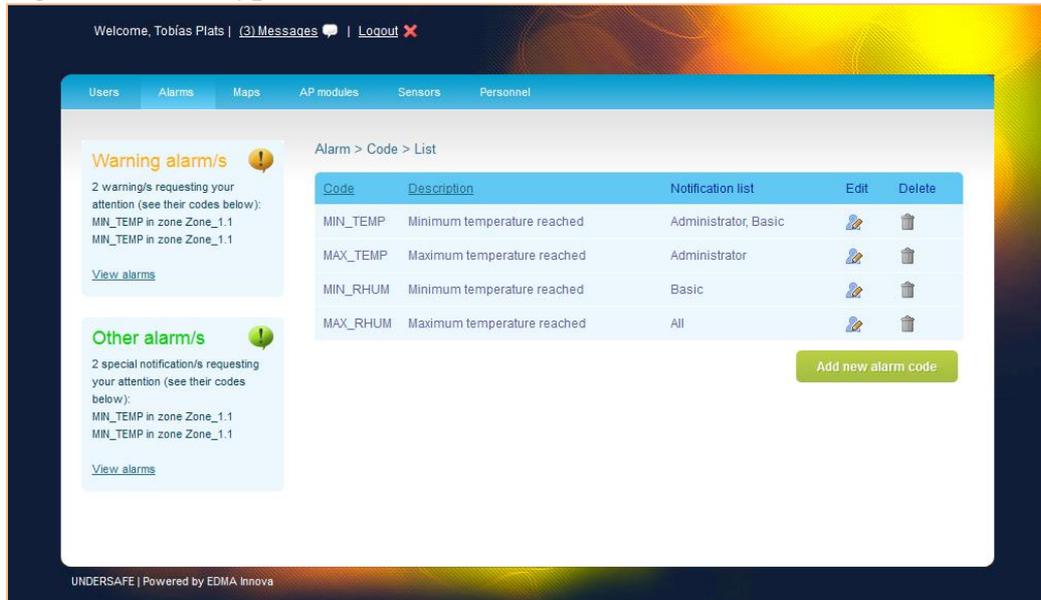
Fig. 40: Alarms codes list view.
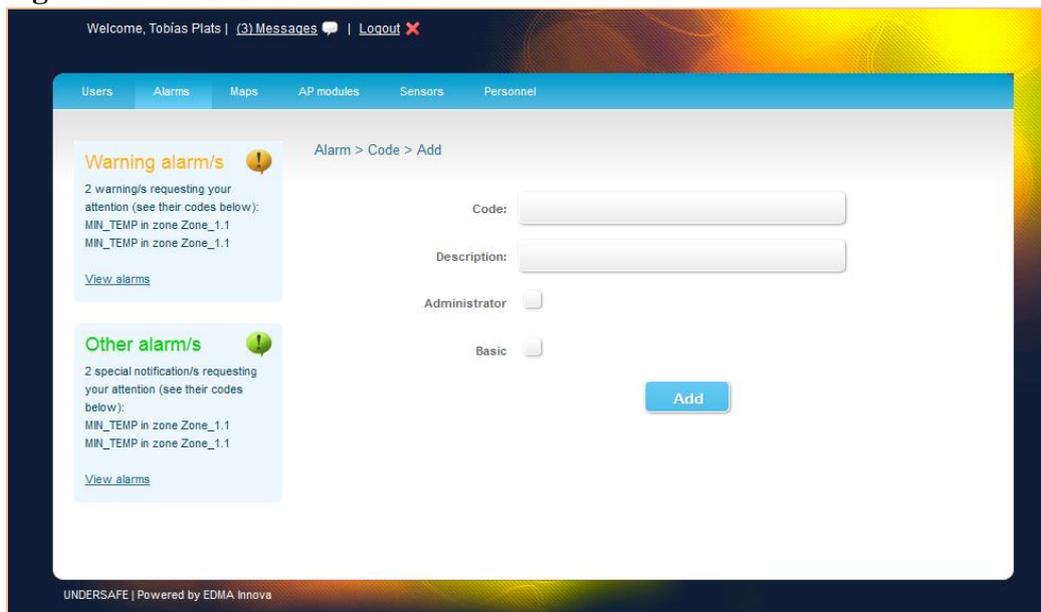
Fig. 41: Alarms codes add view.

Fig. 42: Floors list view.
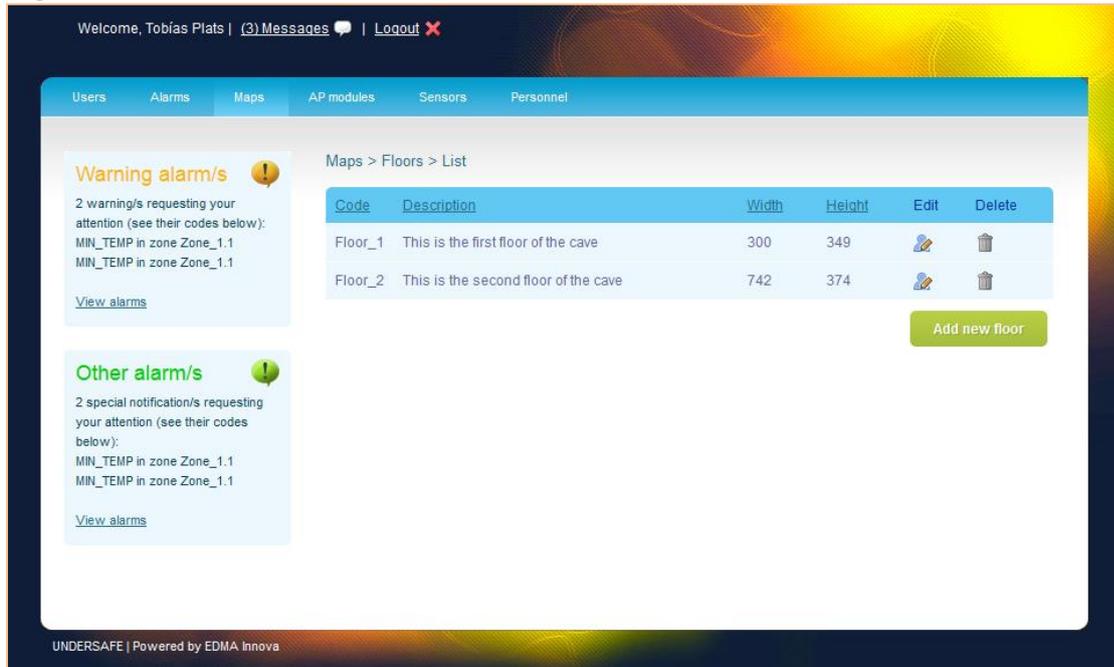
Fig. 43: Floors add view.
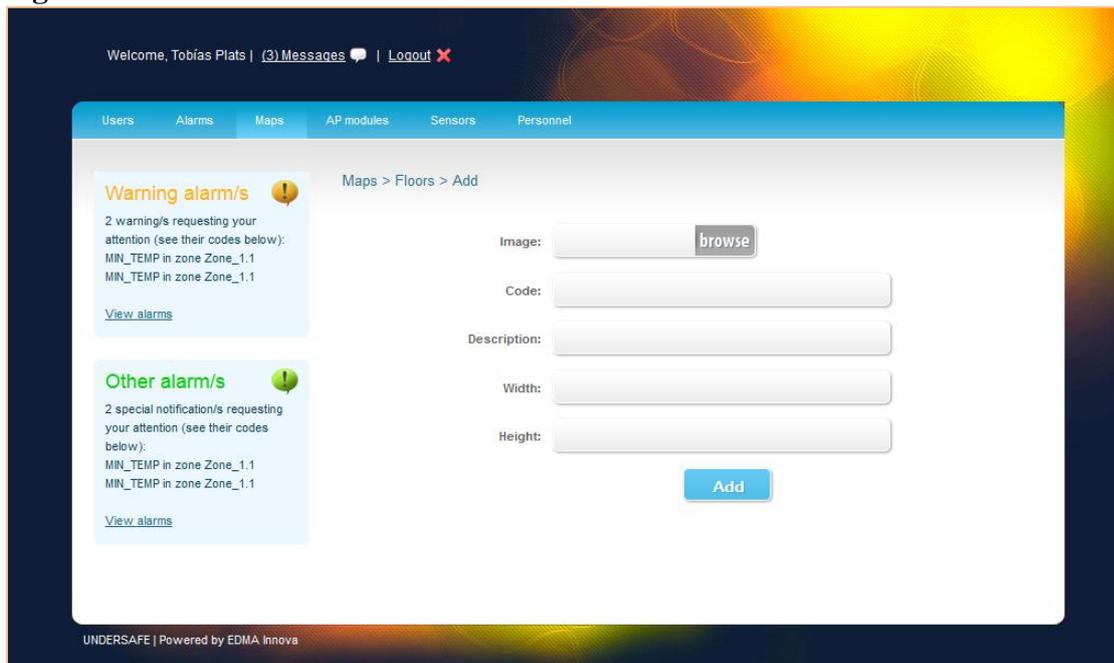
Fig. 44: Zones list view.
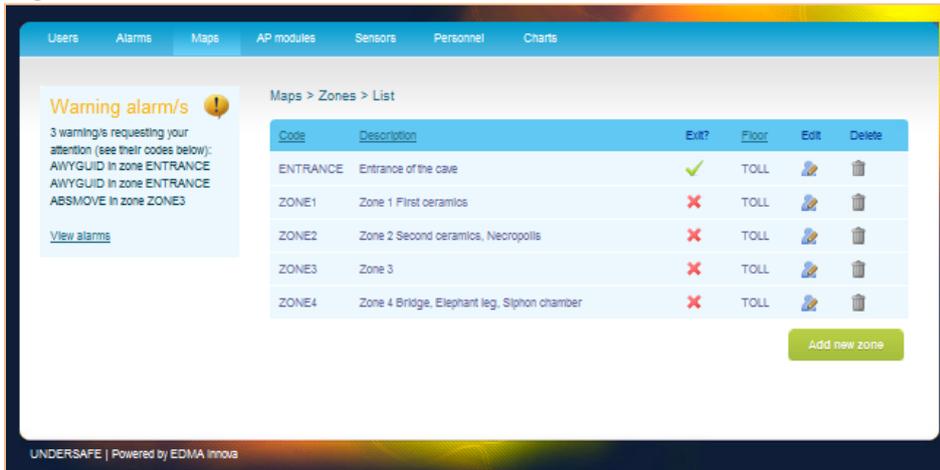
Fig. 45: Zones add view.
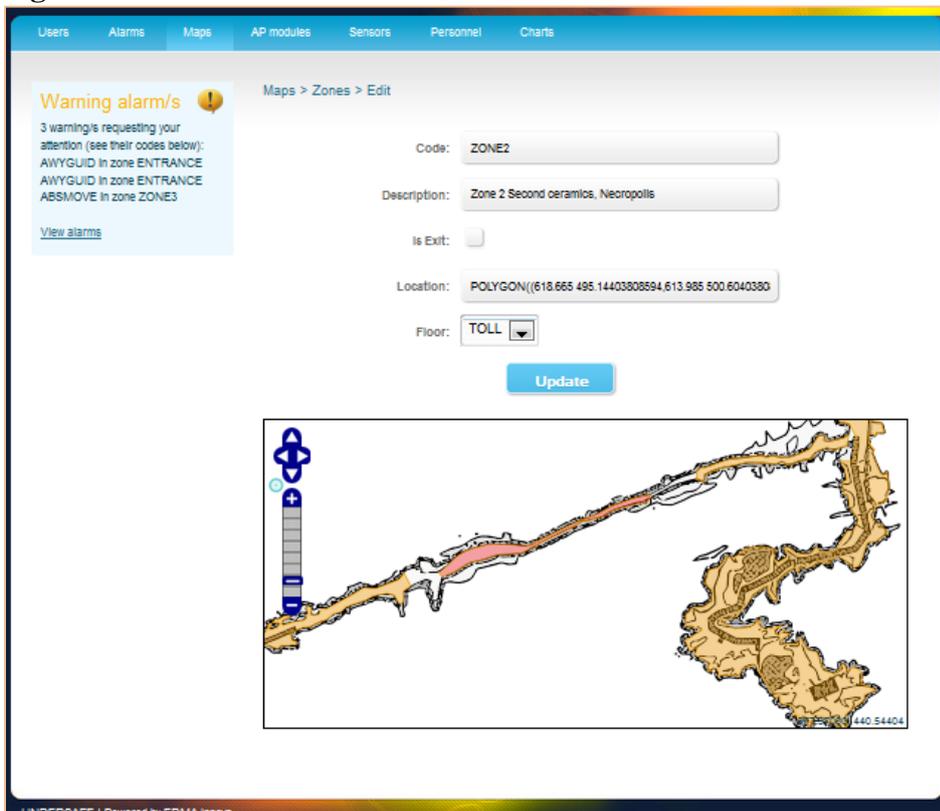
Fig. 46: Map view (I).
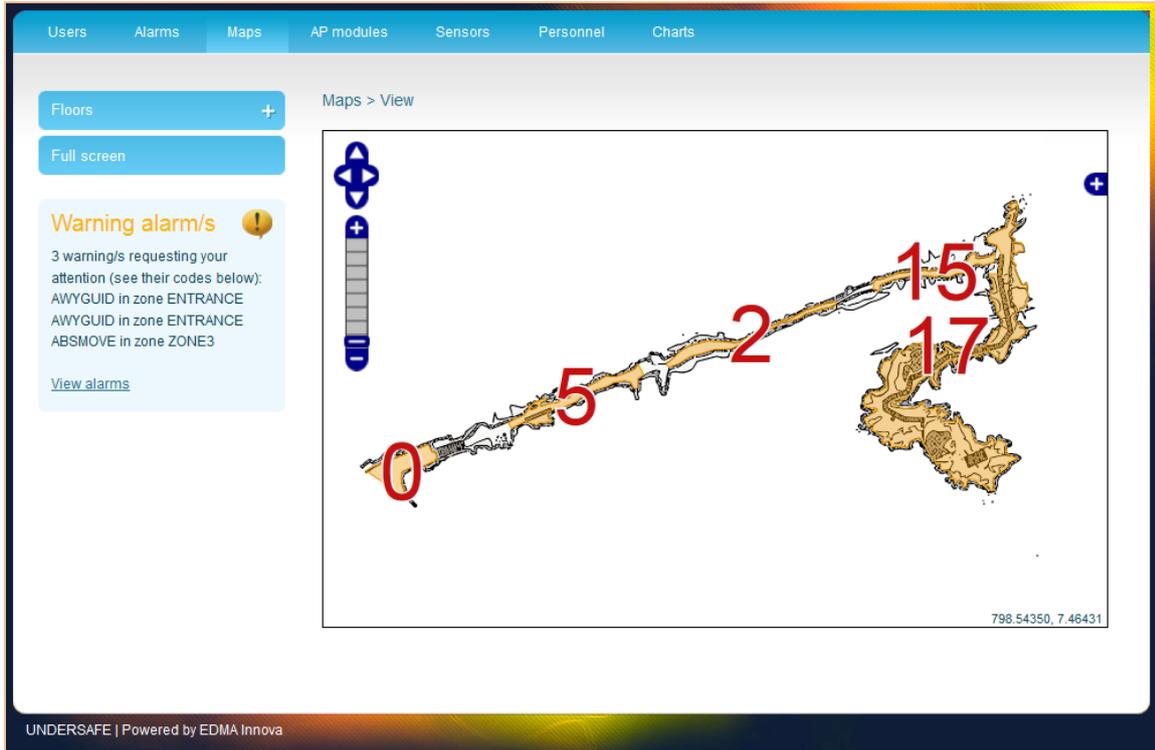
Fig. 47: Map view (II).
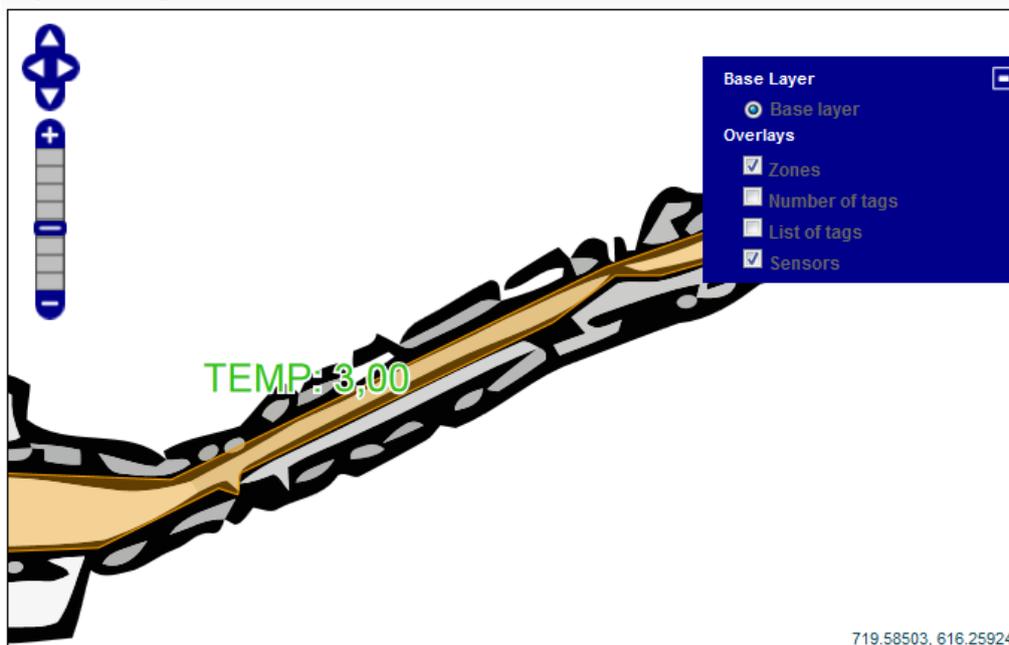
Fig. 48: Map view, full screen.

Fig. 49: AP Modules list view.

Fig. 50: AP Modules edit view.
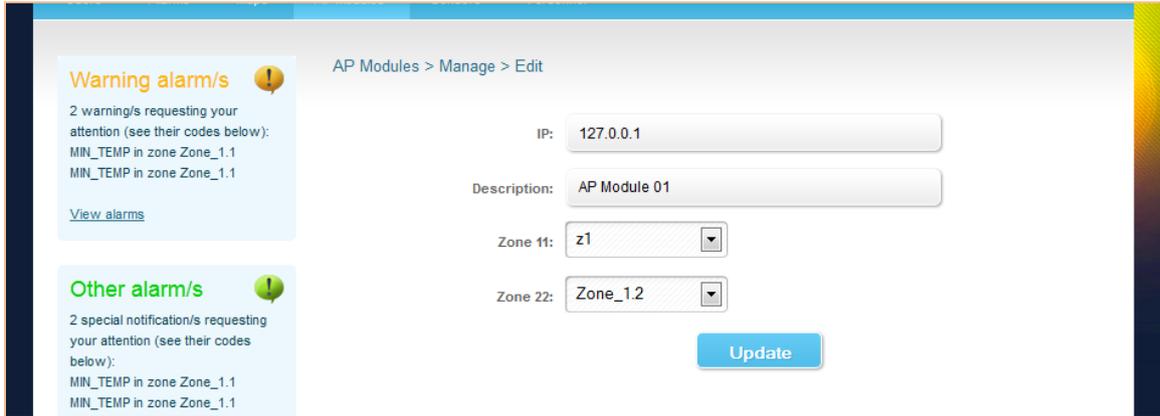
Fig. 51: Sensor types management (I).
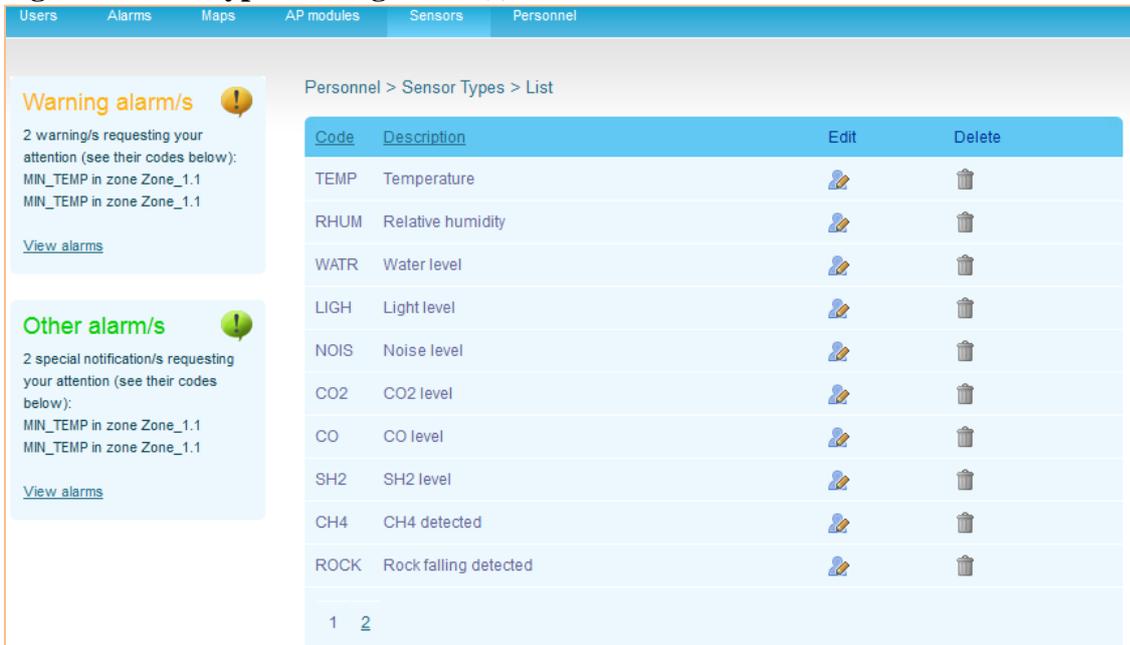
Fig. 52: Sensor types management (II).
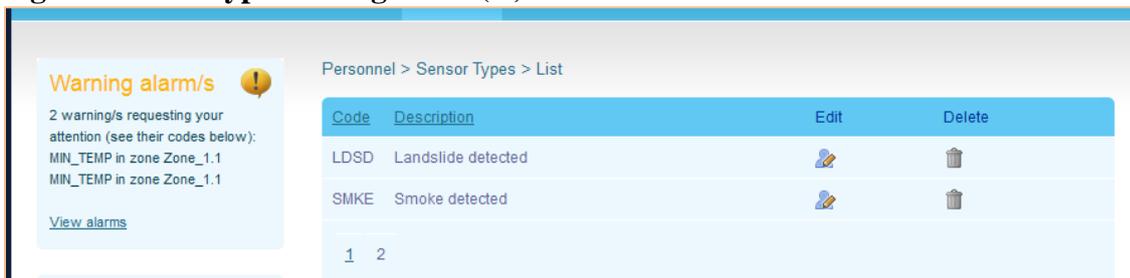
Fig. 53: Sensor types edit view.
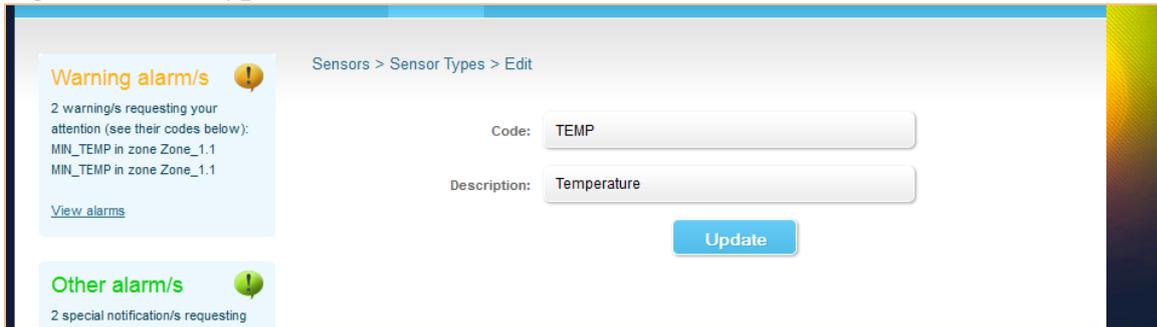
Fig. 54: Sensor list view.

Fig. 55: Sensor edit view.
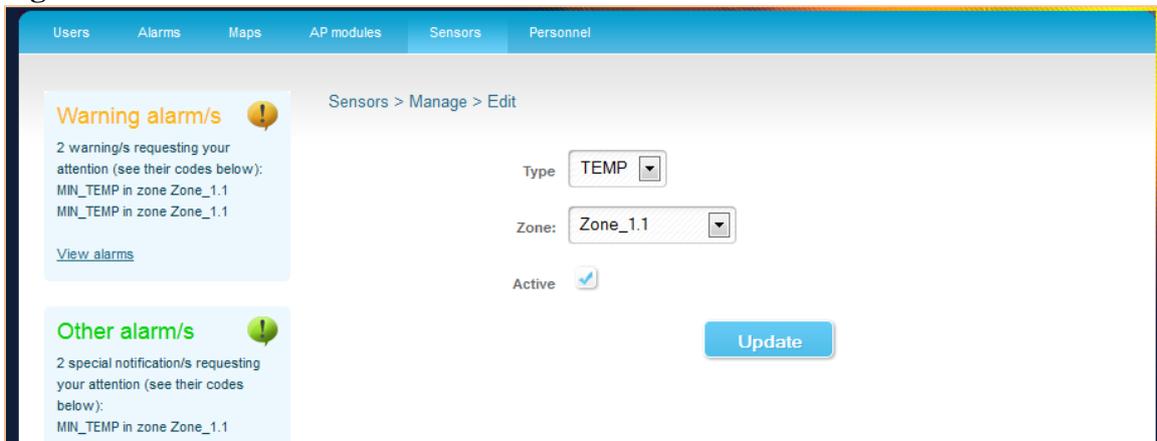
Fig. 56: Personnel list view.
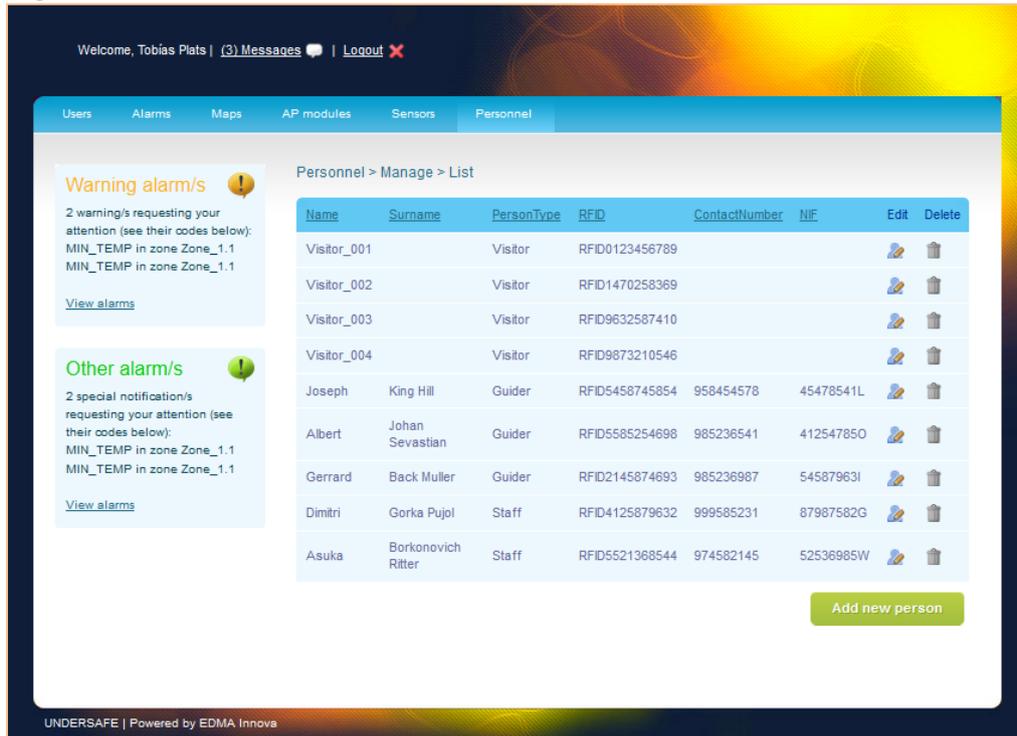
Fig. 57: Personnel edit view.
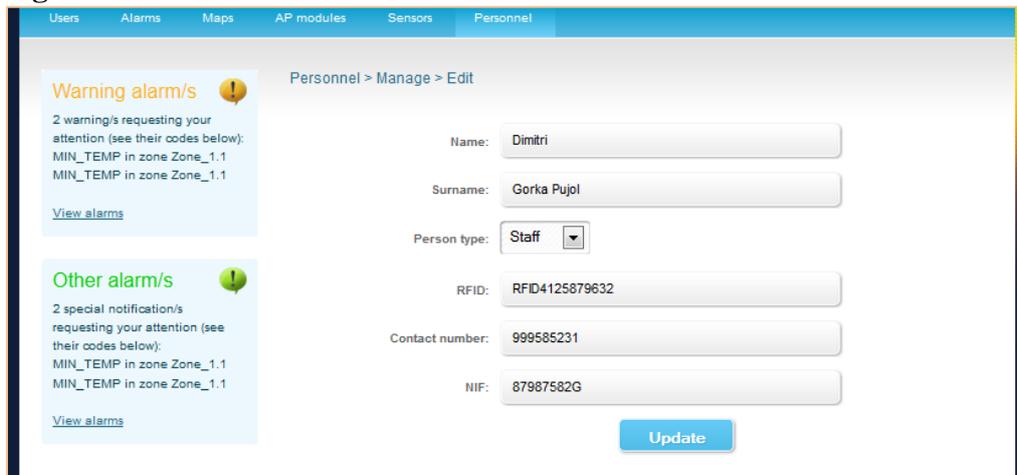
Fig. 58: Person types list view.
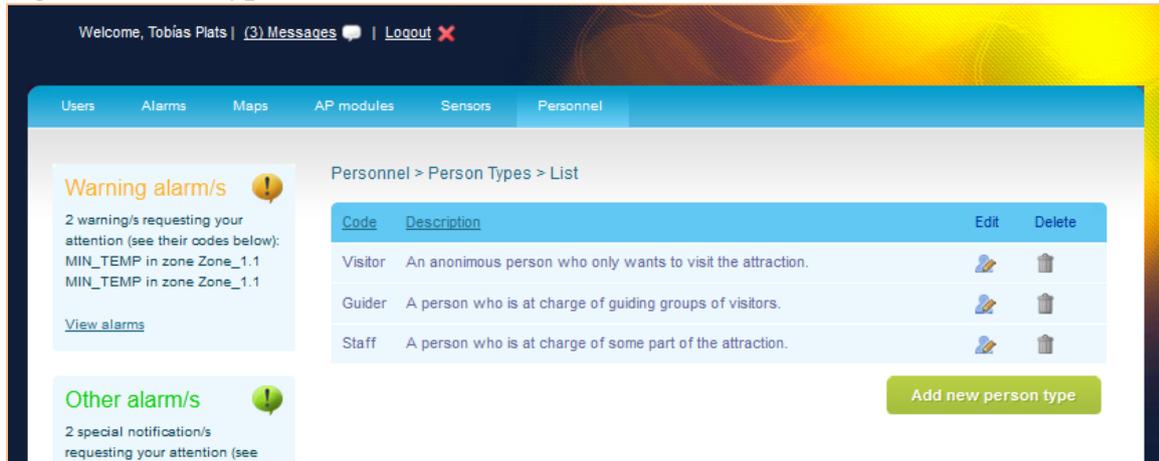
Fig. 59: Person types edit view.

Fig. 60: Groups list view.

Fig. 61: Groups add view.

Fig. 62: Groups edit view (I).

Fig. 63: Groups edit view (II).

Fig. 64: Charts, configuration screen (I).

Fig. 65: Charts, configuration screen (II).
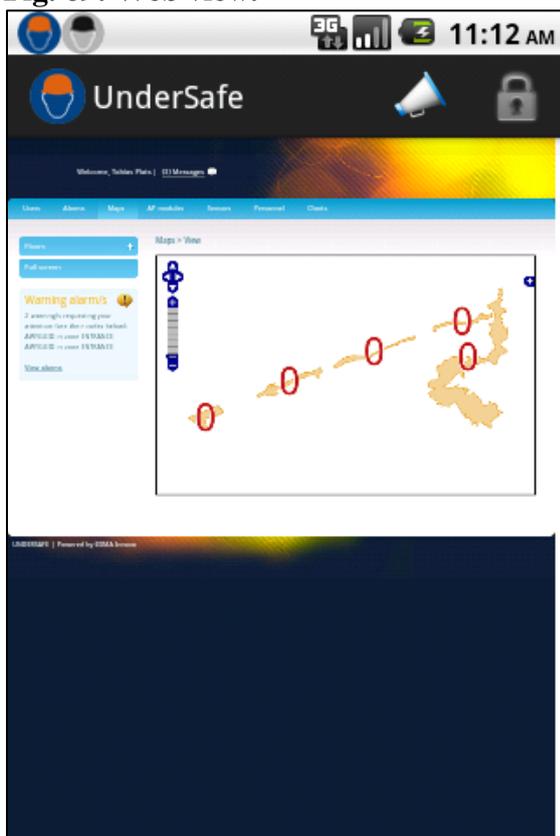

Fig. 66: Charts, plot screen.
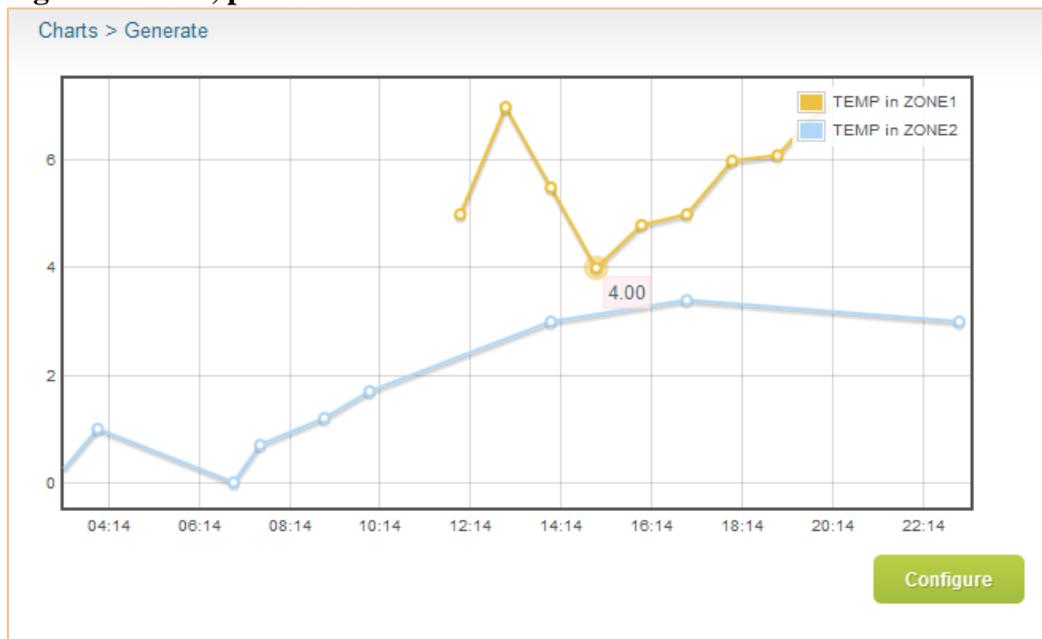
Fig. 67: Charts, zooming and panning.
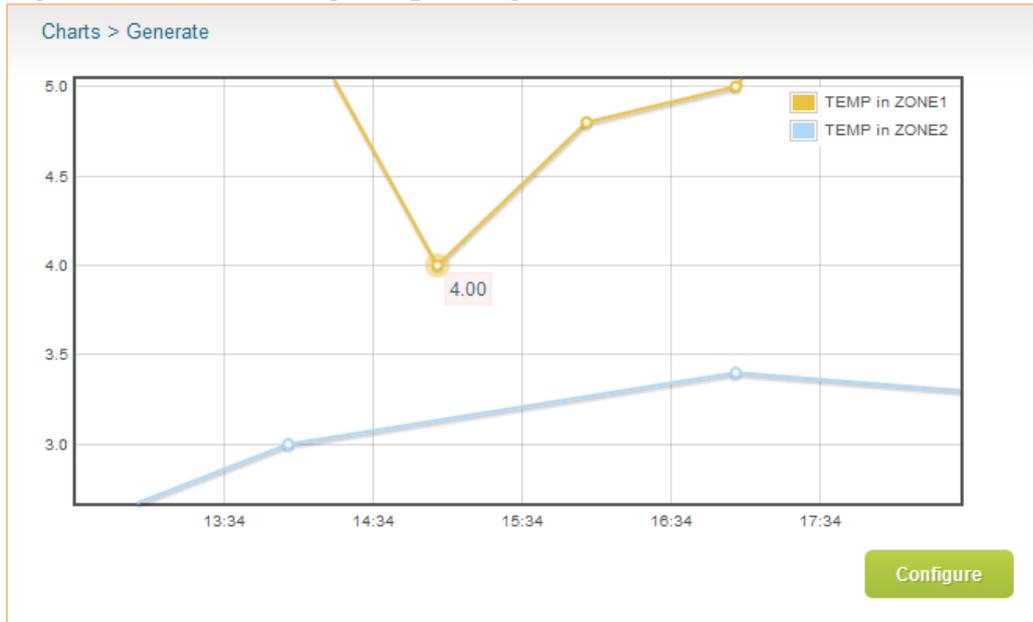
Fig. 69: Web view.

Fig.70: How GCM works.

Android - Google Colud Messaging   AndroidHive

database

server

mobile   GCM

1. First android device sends **sender id, application id** to GCM server for registration.
2. Upon successful registration GCM server issues **registration id** to android device.
3. After receiving registration id, device will send **registration id** to our server
4. Our server will store **registration id** in the **database** for later usage

a   Whenever push notification is needed, our server sends a **message** to GCM server along with device **registration id** (which is stored earlier in the database)

b   GCM server will delevers that message to respected mobile device using device registration id
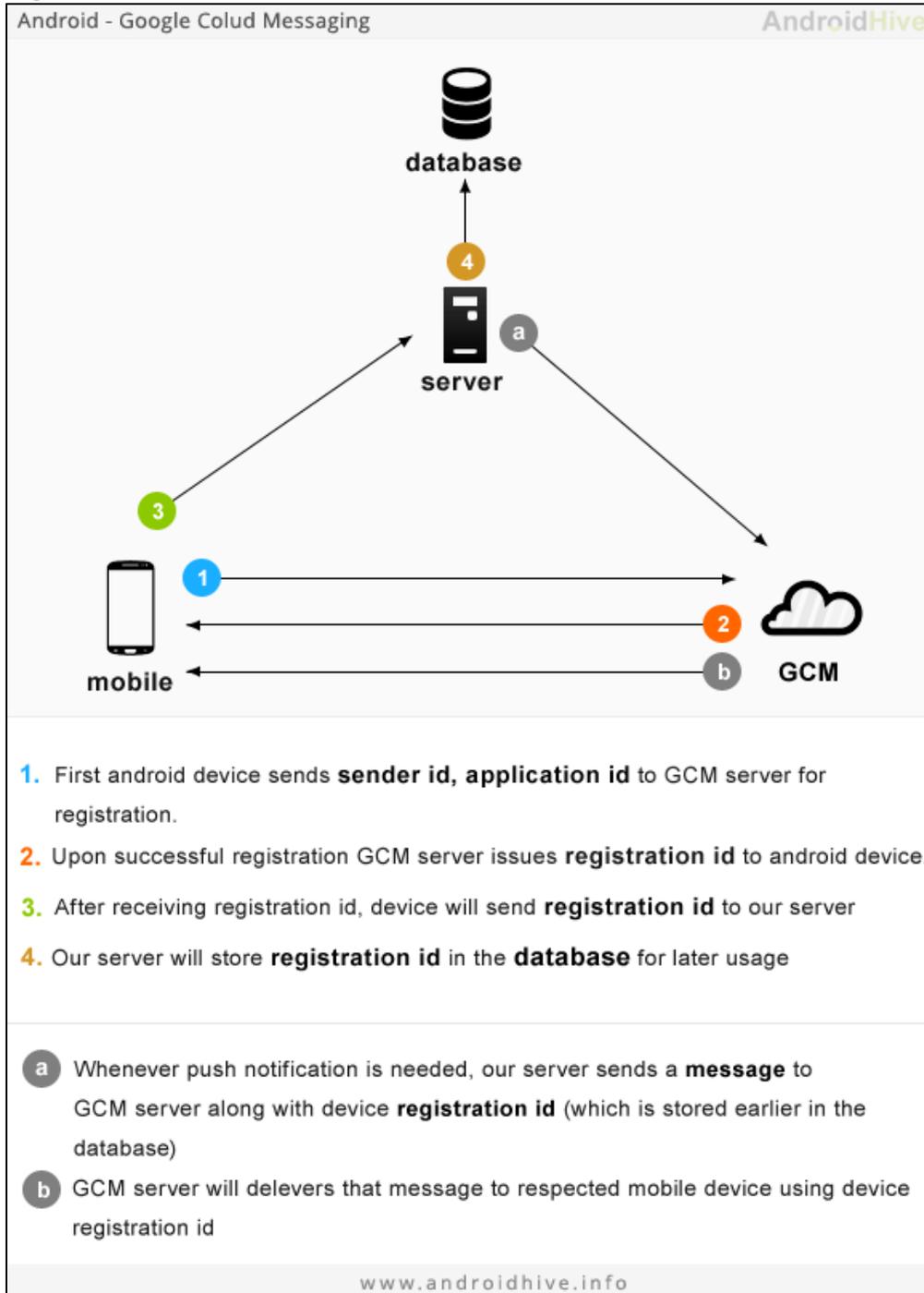
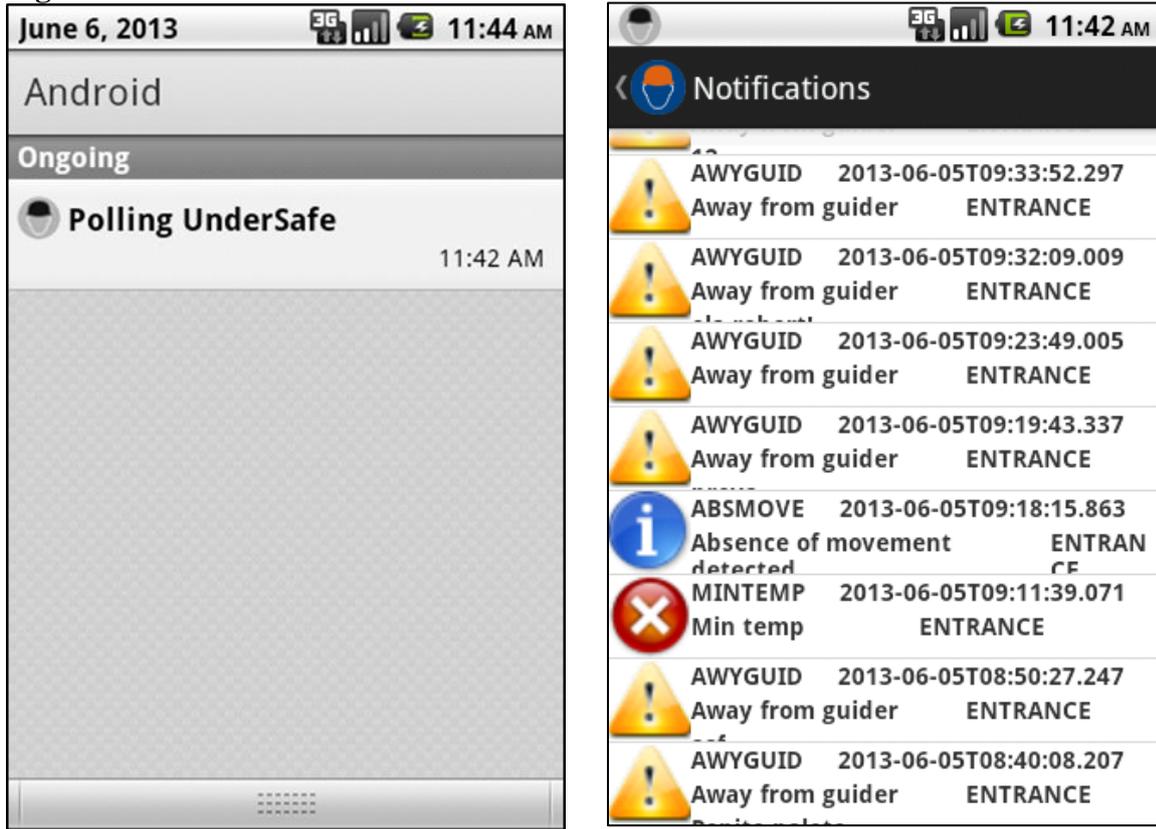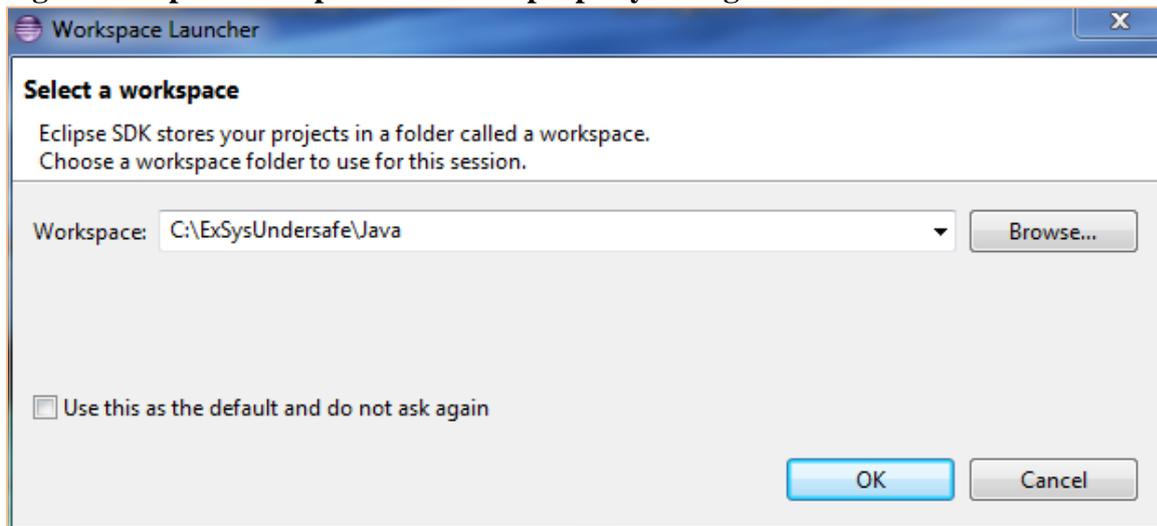www.androidhive.info

Fig. 71: Alarms on mobile device.

Fig. 72: Microsoft SQL Management Studio initial login window.
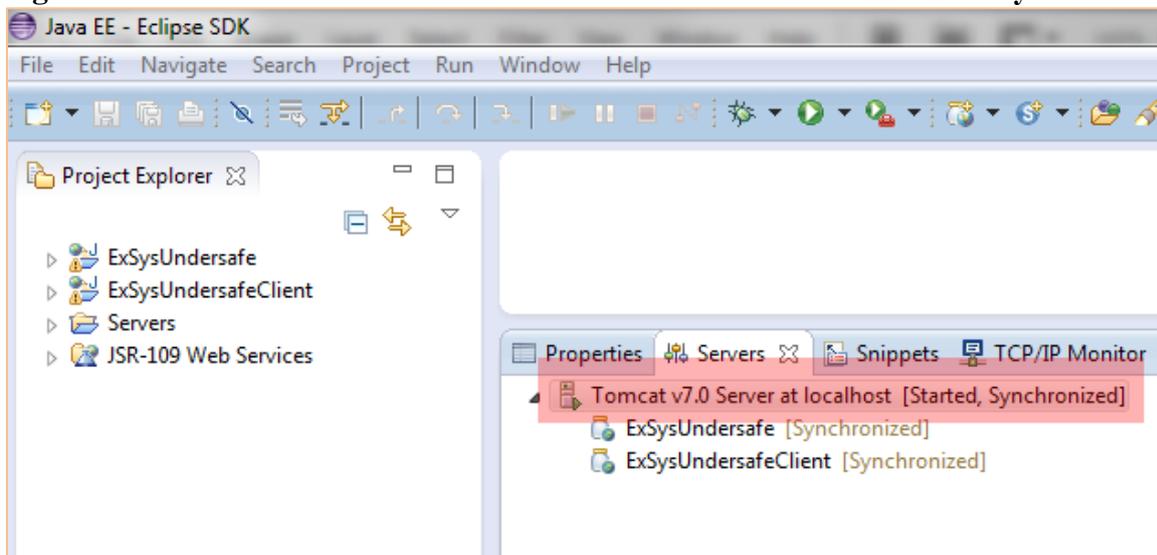
Fig. 73: Microsoft SQL Management Studio initial login screen, with the recently created user.
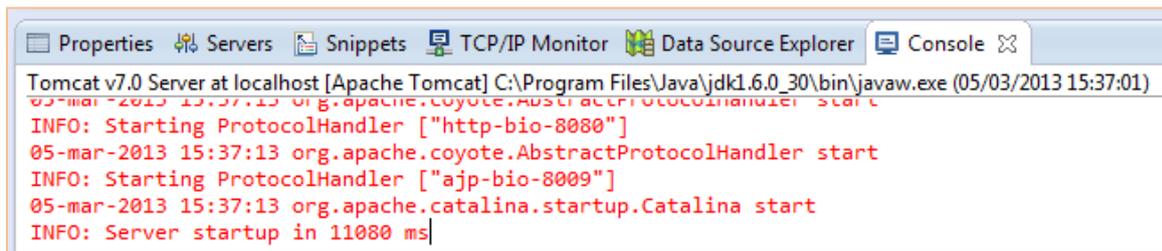

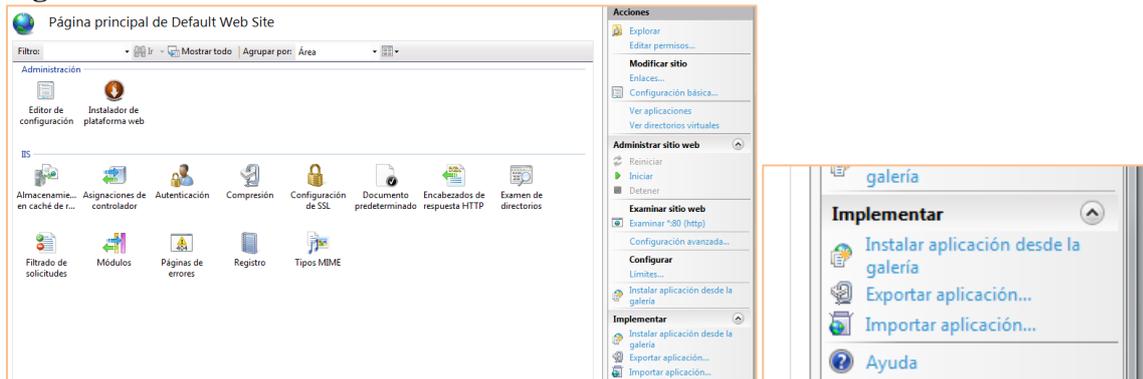**Fig. 74: Eclipse Workspace Launcher properly configured.**

Fig. 75: Servers tab with "Tomcat v7.0 Serever at localhost" started and synchronized
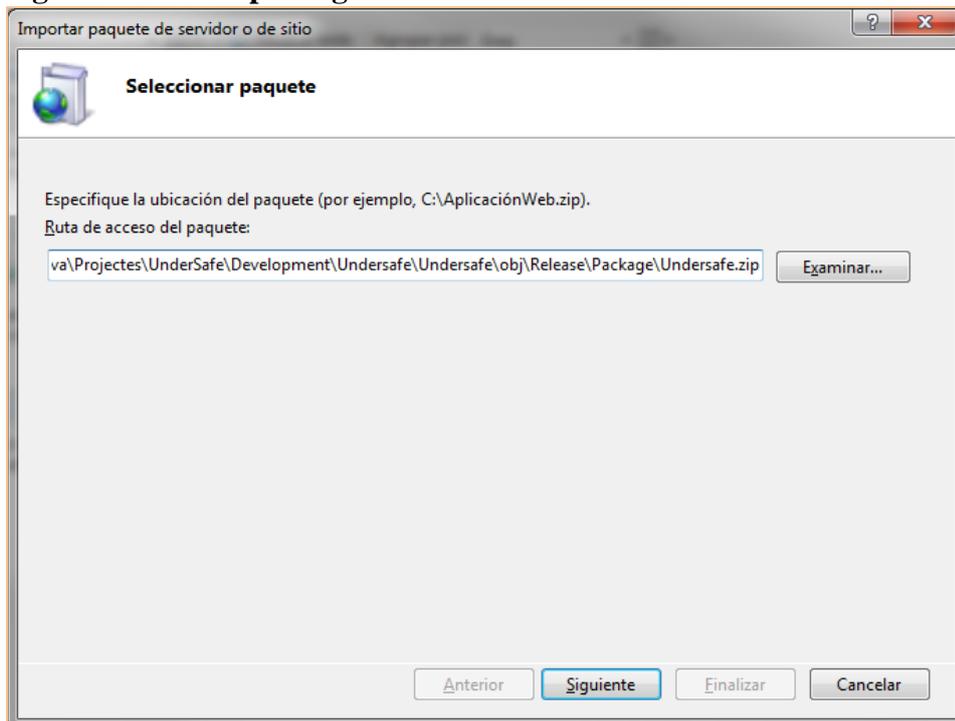
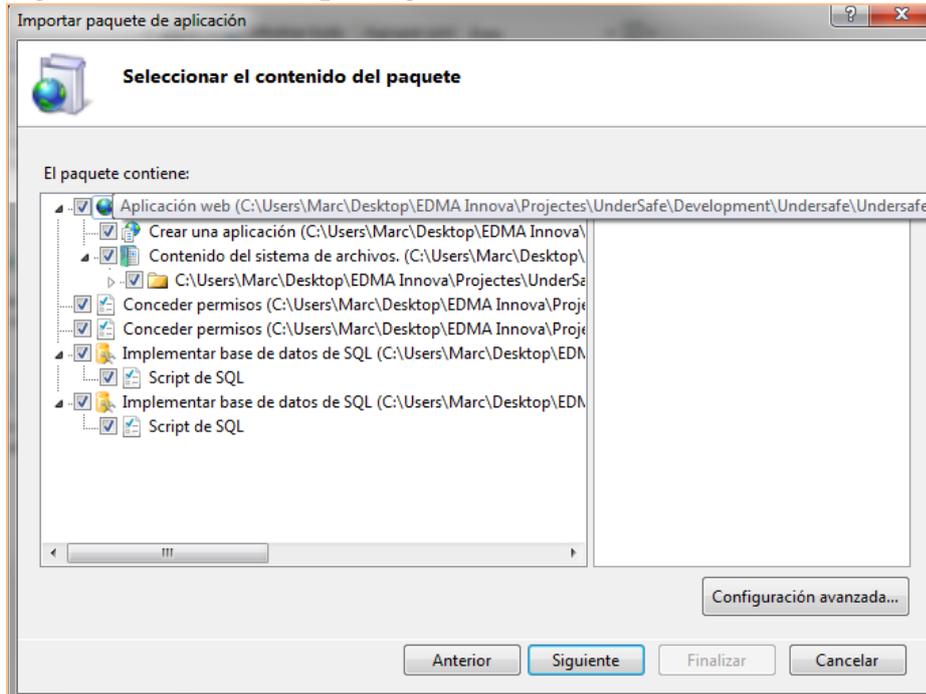**Fig. 76: ExSysUnderSafe has been properly deployed.**

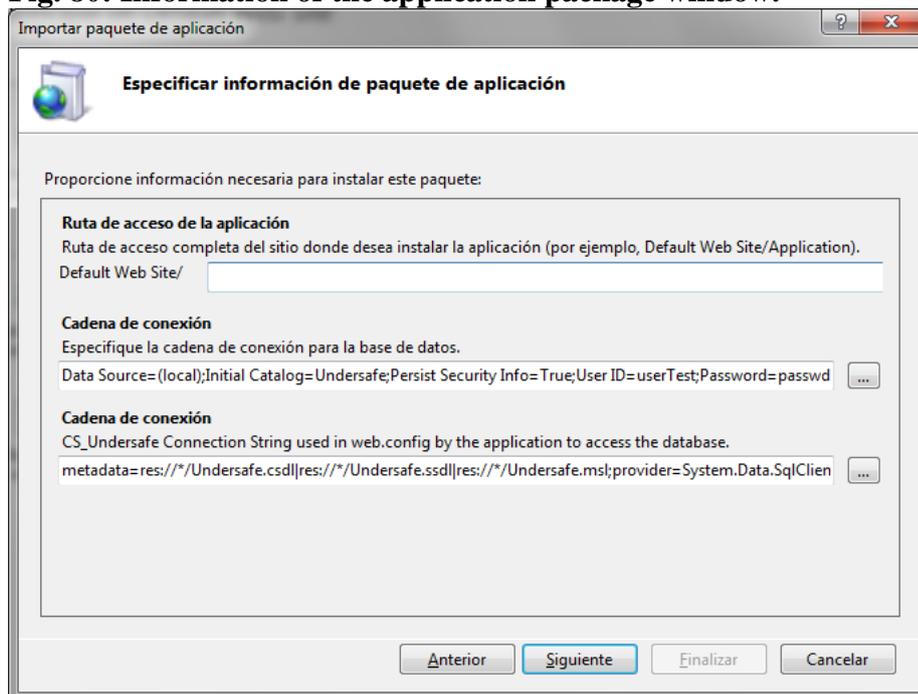**Fig. 77: IIS main menu window.**

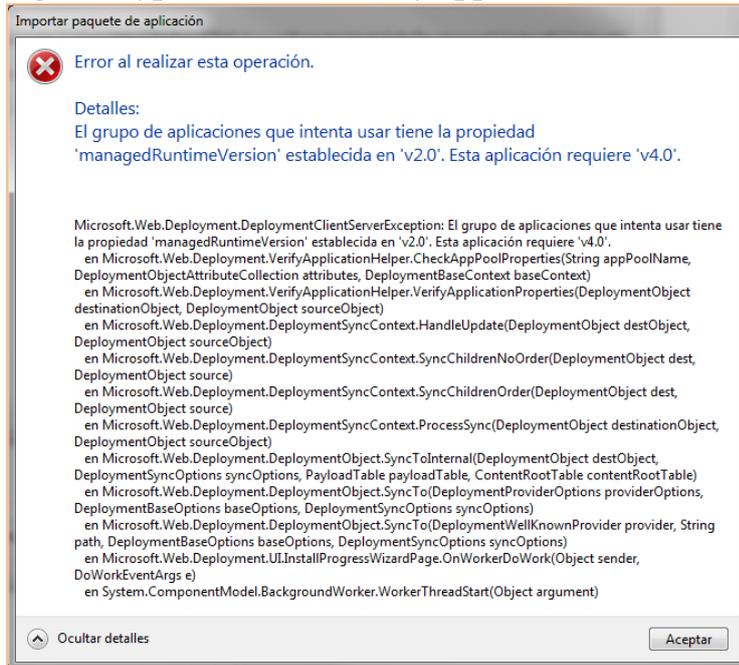**Fig. 78: IIS select package window.**

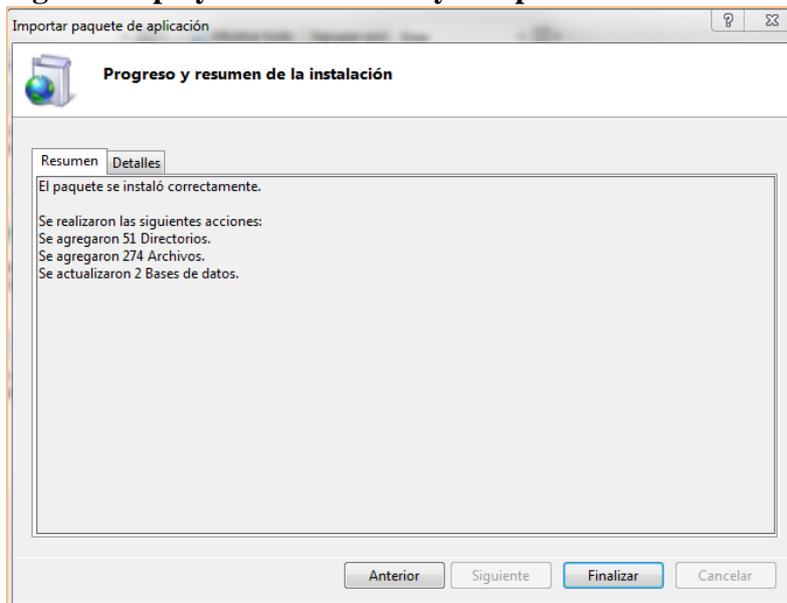**Fig. 79: Content of the package selection window.**

Fig. 80: Information of the application package window.

Fig. 81: Typical error that may appear...

Fig. 82: Deployment successfully completed.

Fig. 83: UnderSafe login screen.