



**Management Of Networked IoT Wearables – Very Large Scale
Demonstration of Cultural Societal Applications**
(Grant Agreement No 732350)

**D6.6 Library of MONICA Apps for Smartphones And
Smartwatches 2**

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1 Executive Summary

MONICA provides a number of smartphone apps for professional users (e.g. security staff) and for public use by event visitors. They are part of the infrastructure to build and maintain a Common Operational Picture (COP) on the MONICA platform. This document is the second update of the software deliverable D6.5.

This deliverable includes the following MONICA apps:

- the Guard App: intended for use by guard event staff for reporting and management of incidents interacting with staff at the Command central COP, using phones or smartglasses;
- the StaffTracker App: used to track the locations of the event management staff;
- the Visitors App: public app intended for event visitors providing details on the event and the available facilities as well as guidance such as the locations of Exits and First Aid points, as well as support for locating missing persons.

The main updates compared to the previous version of this deliverable are

- support for locating missing persons in the Visitors app;
- the Professional Sound App;
- the Security App;
- support for the COP on mobile devices.

The MONICA apps and platform were successfully deployed and demonstrated at a total of 8 different events during the reported period.

2 Introduction

This document accompanies the *demonstrator* (software) deliverable D6.5 and refers to the Apps implementing the mobile support for building the *common operation picture* (COP) in MONICA, and for use by event staff and public visitors. We refer to the accompanying software deliverable D6.4 *Decision Support Platform with Common Operational Picture* for an overview of the COP components, tools and interfaces.

The following MONICA apps are currently deployable:

- the Guard App: used with smartphones and smartglasses by event staff for reporting and management of incidents interacting with staff at the command central COP;
- the StaffTracker App: app used to track the locations of the event management staff.
- the Visitor App: public app intended for event visitors providing details on the event and the available facilities as well as guidance such as the locations of Exits and First Aid points;
- the Professional Sound App;
- the Security App.

Events covered during the period where the MONICA apps were deployed and demonstrated include

- Kappa Futur Festival, Turin July 2018,
- Emerald Headingley Stadium, Leeds August 2018,
- Friday Rock Tivoli, Köpenhamn August 2018,
- Pützchens Markt, Bonn September 2018,
- Movidia, Turin October 2018,
- Winter DOM, Hamburg November 2018,
- Fête des Lumières, Lyon, December 2018.

3 Smartphone and smartglasses apps

3.1 Guard app

The screen shots below show the reporting and management of an incident with an app intended for use by guard event staff, interacting with the COP application used by the command central staff.

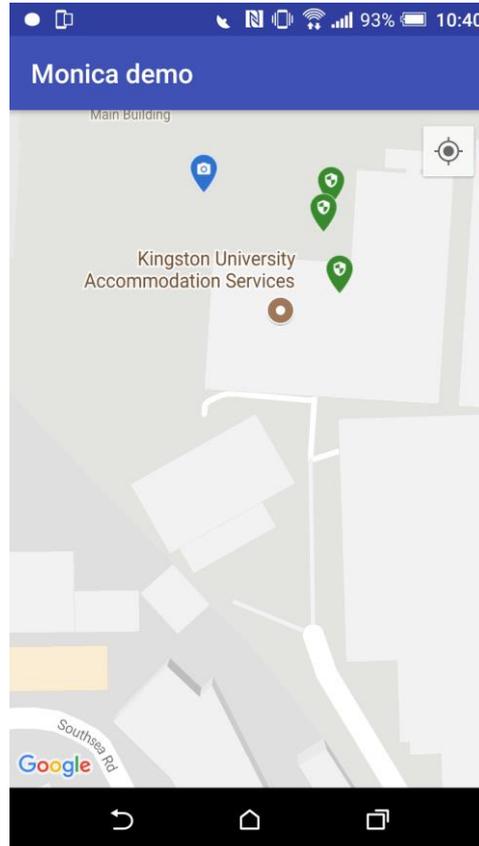


Figure 1: Guard App map of event area.

The guard and command central users (see deliverable D6.3) are presented with similar map views for an event (Figure 1). The map shows various icons such as the positions of guards (green) and the locations of cameras (blue) as well as suspected or ongoing incidents.

The Guard App can be used with iOS and Android smartphones, and with face mounted smartglasses (Optinvent ORA-glasses¹, Figure 2). The latter freeing the users both hands while still being able to receive information from the command central staff.

The ORA-2 enables hands free mobile computing and AR applications such as remote maintenance, logistics, remote training, situation awareness, and much more. It can run applications as a standalone wearable computer and can connect to the network via Wi-Fi and to any smart device via Bluetooth. The ORA-2 features a disruptive transparent retinal projection technology for a crisp, bright image display. The virtual screen of the ORA-2 has two configurations, allowing both “augmented reality” and “glance” modes.

¹ http://www.optinvent.com/our_products/ora-2/
Document version: 1.0


Figure 2: ORA-2 device

Figure 3: Bluetooth controller

The purpose of this device with the MonicOra App, is to share messages, photos, videos, and audios with a COP. Connected by GPS, and Wi-Fi, the device has the possibility to be tracked on a map so it is easy to manage the deployment of the closest police officers for example.

The MonicOra App was built for different Monica events and was tested by police officers, in the Movidia pilot, Turin, and private security staff hired by the city of Lyon for the Fête des Lumières, as well as for a rugby match in Leeds. It is easy to adapt the content according to the staff. We just need to upload predefined messages used by the police, medical staff and security guards.

The user has a transparent screen in front of an eye, and can thus still be aware of the surroundings. Navigation in the app is facilitated by a 4 positions joystick in a hand-held Bluetooth controller, without the need for any other input method, making it easy to use. As an example, moving the joystick to the right allows you to open the message menu. Then, after finding the right message, you can validate by moving again to the right. To go back or cancel, you move to the left and so on. A separate button turns off the brightness during moments where there is no need to exchange information. The brightness automatically turns back on when data from the COP is received by the glasses.


Figure 4: MonicOra menu

The main menu presents 4 options: *Messages*, *Record Video*, *Take Pictures* and *Record Audio*. Using the BT joystick, you can load predefined messages or record video, audio, or a picture and send them quickly. The COP, however, is less limited and has the flexibility to send to one user, to some devices, or to all devices:

1. customized or predefined messages (for example to inform about the search for a criminal) to you, to some devices, or to all devices;
2. pictured (such as the ID of the person), videos (such as a “first aid procedure” video), and audio.

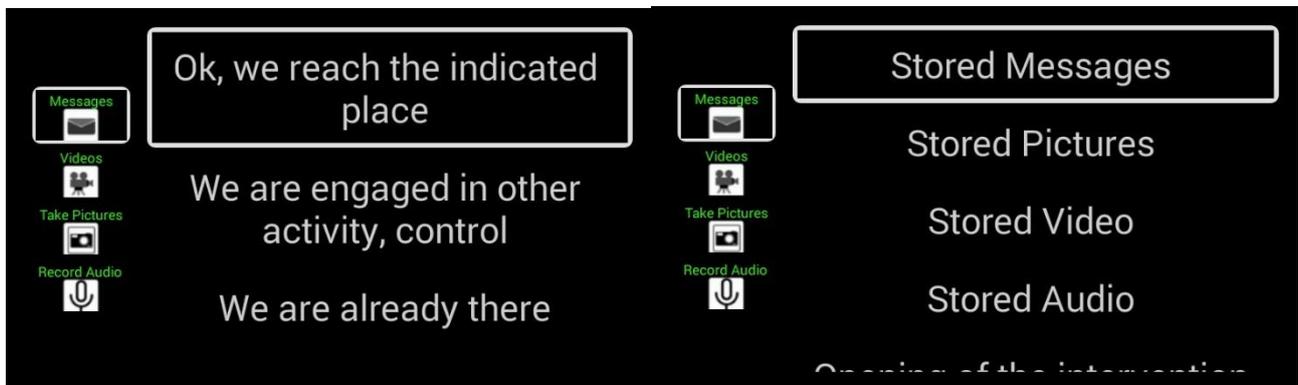


Figure 5 : Predefined Messages section

Figure 6: Storage section



Figure 7: Recording section

All data sent and received are stored and accessible in the App. The user can, at any time, see old messages, photos, videos and audio received if he needs to.

Depending on the conditions of use, the application may need to use a lot of hardware resources. Therefore, the nominal battery life is around 1h and 30min. However, it is possible to plug in an external power-bank while the device/app is running.

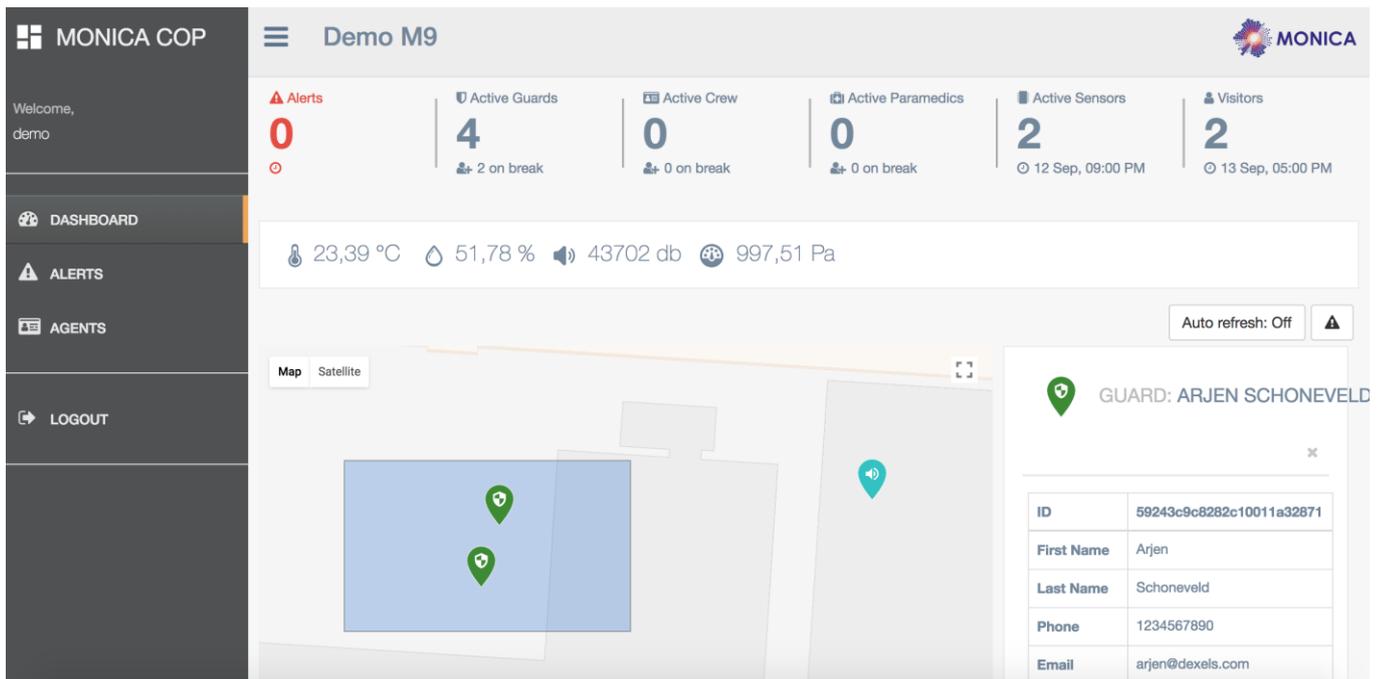


Figure 8: Command staff view, locating a guard in the COP interface.

The command staff navigates in the COP screen (see also D6.3) and notices incident alerts on the map. The commander searches for a guard and the system displays a suggestion (“Arjen”) in the lower right in Figure 8. The location of guards and other security staff is reported by a separate app, the StaffTracker (see below) installed on the security staff smartphones or by the *ultrawide band* (UWB) wristbands, depending on the type of pilot area.

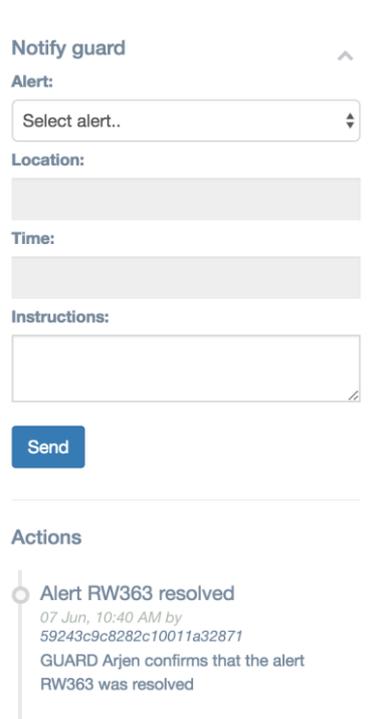


Figure 9: Guard selected

Once the commander selects a guard, the incident can be assigned to be resolved.

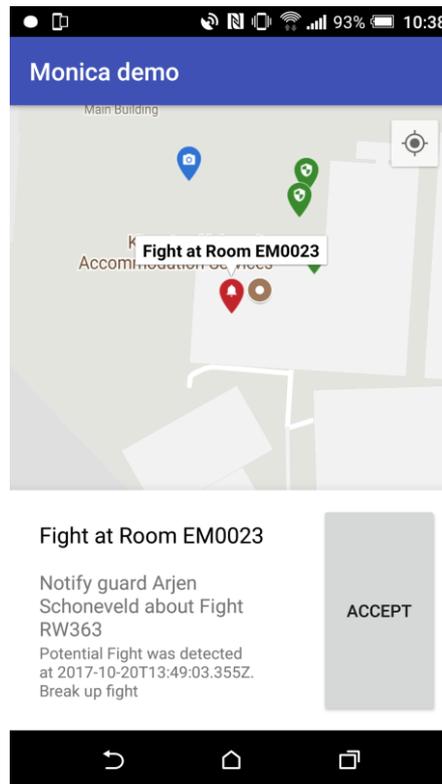


Figure 10: Selected guard is notified and can ACCEPT assignment

Once the guard accepts the assignment, a notification is sent to the COP application. The commander can see that guard has accepted, and a brief description of the status and measures to be taken.

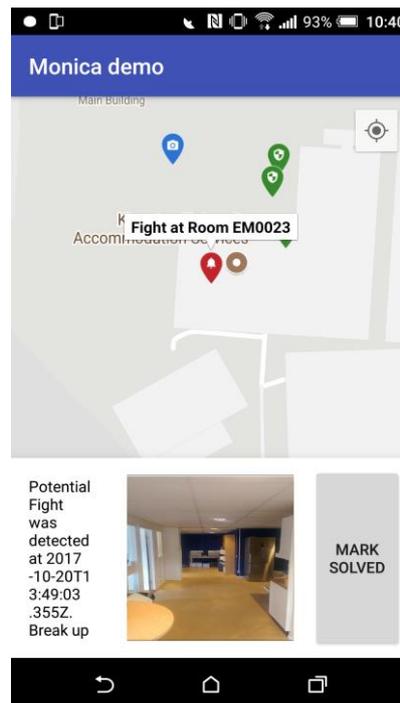


Figure 11: Guards interface to resolve incident

Once the incident is marked as “resolved” by the guard (Figure 11), all related data is removed from the COP and all the connected Apps

3.2 StaffTracker app

StaffTracker is an Android app used to track the locations of the event management staff. This application is installed on staff mobile phones. The application depends on the Android phone location services and Internet connectivity.

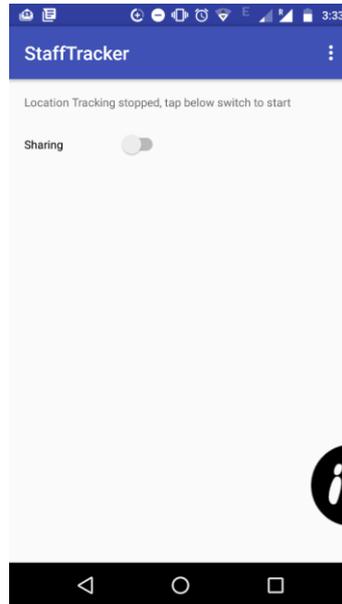


Figure 12: First screen when launched

Location tracking can be enabled or disabled whenever required. Once installed, the apps get a randomly generated tag ID (Figure 13). As soon as the location tracking is enabled (Figure 14), the applications register themselves to the SCRAL. The mobile application sends a frequent HTTP request to the SCRAL layer updating the latest locations recorded by the mobile phone. This runs as a background service on an Android phone.

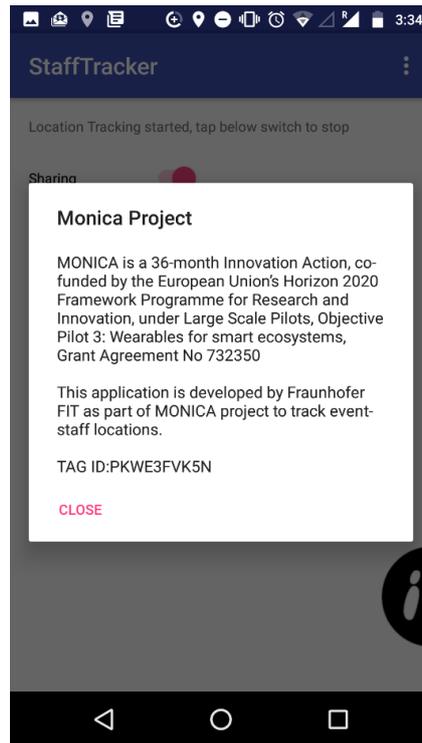


Figure 13: Info Dialog showing ID tag

The user will be provided with constant notifications whenever the location tracking is on (Figure 15). This avoids the user running the location tracking option. The updating rate between two consequent location is configurable by the user (Figure 16). When the location tracking is turned off, the application updates the status to the SCRAL and stops sharing its location. Constant notification is removed from the notification bar.

During the *Rhein in Flammen* event in Bonn, the StaffTracker app was installed on the mobile phones of the security personnel and the locations of the on-duty security guards were tracked live during the event. This location is displayed on the COP dashboard in the security Command central.

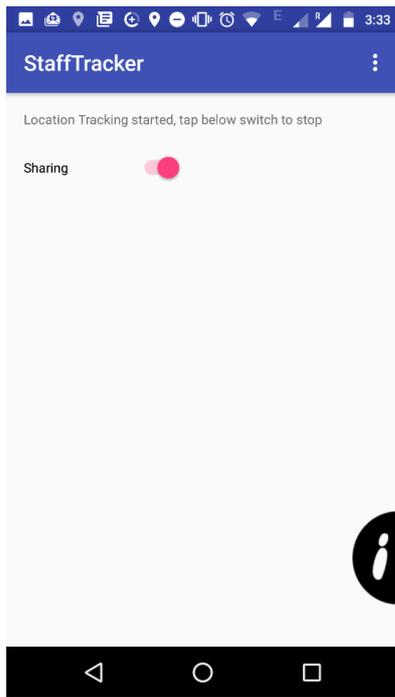


Figure 14: Tracking is on

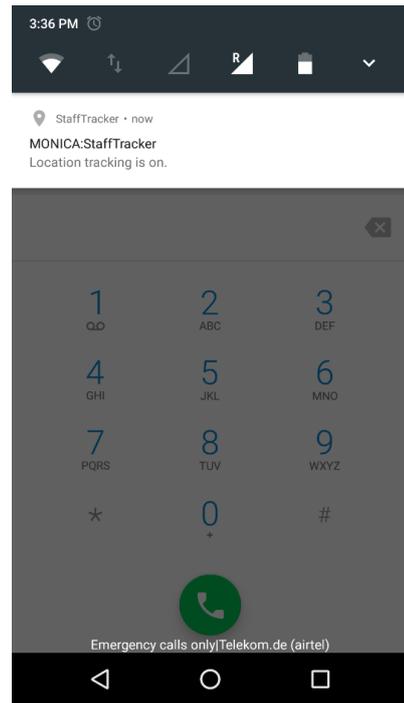


Figure 15: Constant notification when the tracking is running in the background

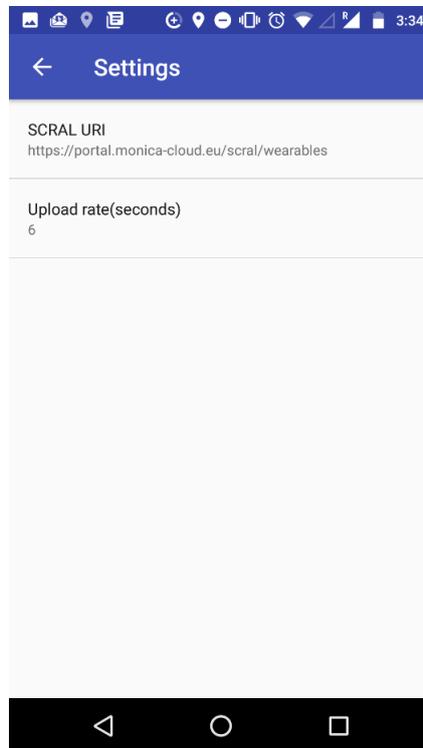


Figure 16: Setting window: to set the maximum location updating rate and the SCRAL URI.

3.3 Visitors app

This is a MONICA public (iOS) app, intended for event visitors. It provides visitors with details on the event and the available facilities, as well as guidance, such as the locations of exits and first aid points. The Visitor app was deployed at a number of European outdoor events. It is available in the [Apple AppStore](#).

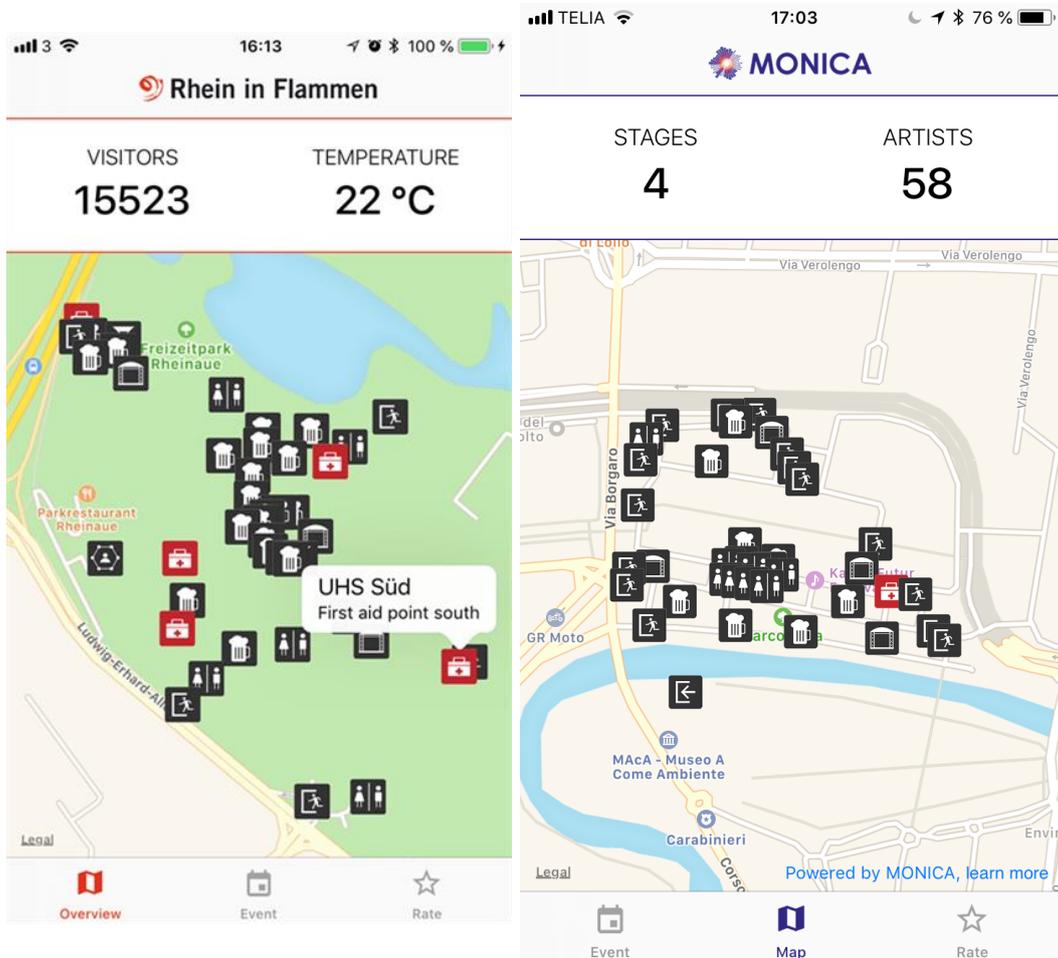


Figure 17: Visitors map view of event sites (Rhein in Flammen and Kappa Futur Festival)

The images in this section show the app as it was configured for a MONICA demo and test at the Rhein in Flammen fest in Bonn, Germany spring 2018 as well as the KappaFutur Festival in Turin. The app is thus customizable with respect to a map layout, displayed properties with their icons and event schedules and timings. This makes possible to reuse the core of the app for future events in the project.

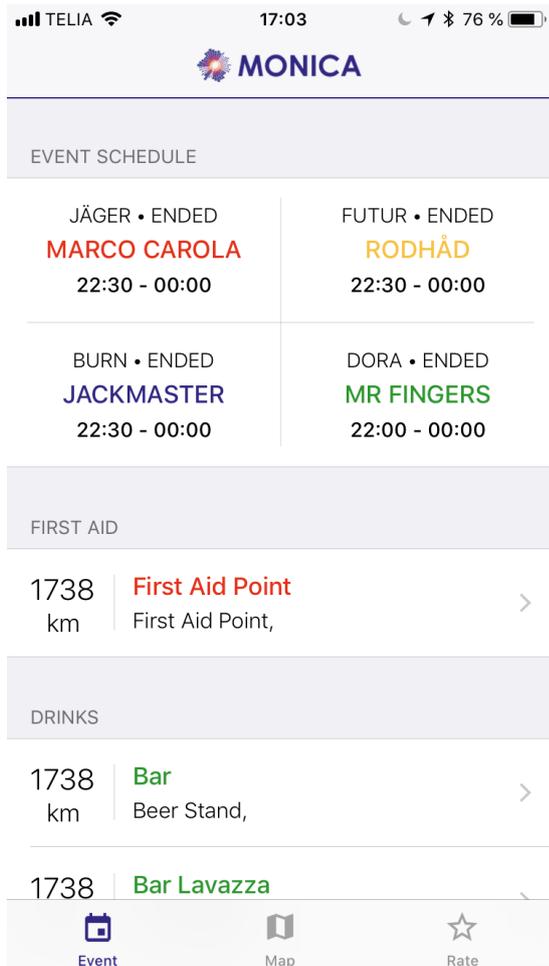


Figure 18: Event schedule

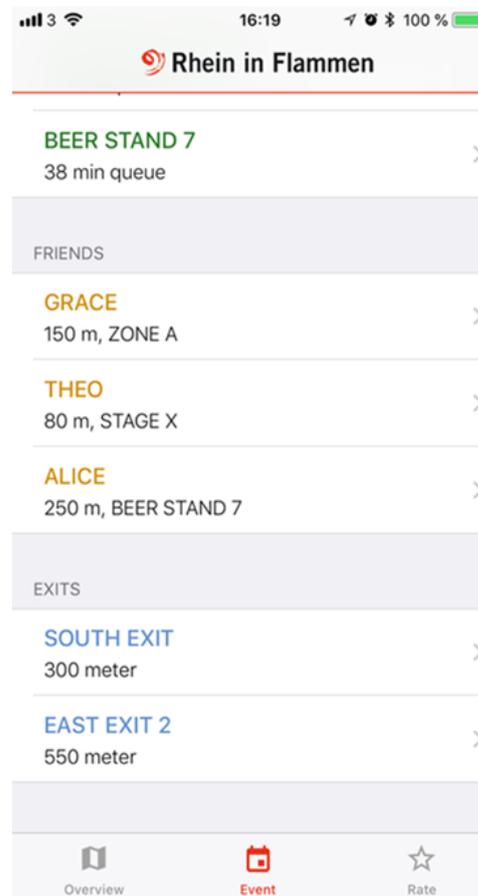


Figure 19: Distances and queue lengths

Figure 18 shows an example of an event schedule, including information on facilities (exits, bars, for instance). The schedule is shown in real-time and is managed locally on the smartphone and does not require an Internet connection, as connectivity may be less reliable at large events.

The app also shows distance to other visitors (Figure 19), based on the use of the Dexels² smart wristband. The distance to the closest exits is also displayed. Using the deployed cameras, the app can also estimate queue lengths (in this case the beer queue at a vendor).

A Feedback App has been developed to allow for visitors to provide direct feedback about various aspects of the event. The feedback questions can be defined dynamically and adapted for the actual event. In this case (Figure 20), visitors were asked to rate the event, the app and the (music) sound levels. No login is required to provide feedback, the Id of the smartphone is used to uniquely record the ratings avoiding visitors submitting multiple responses.

² <http://www.dexels.com>
Document version: 1.0

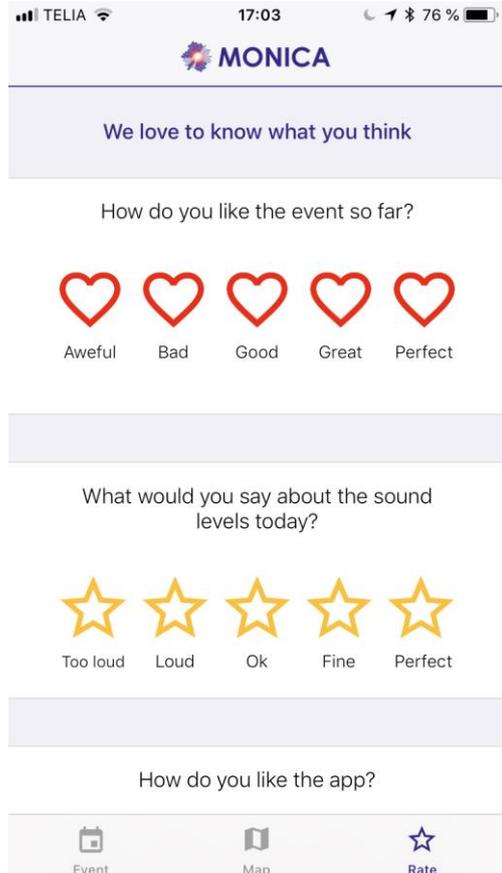
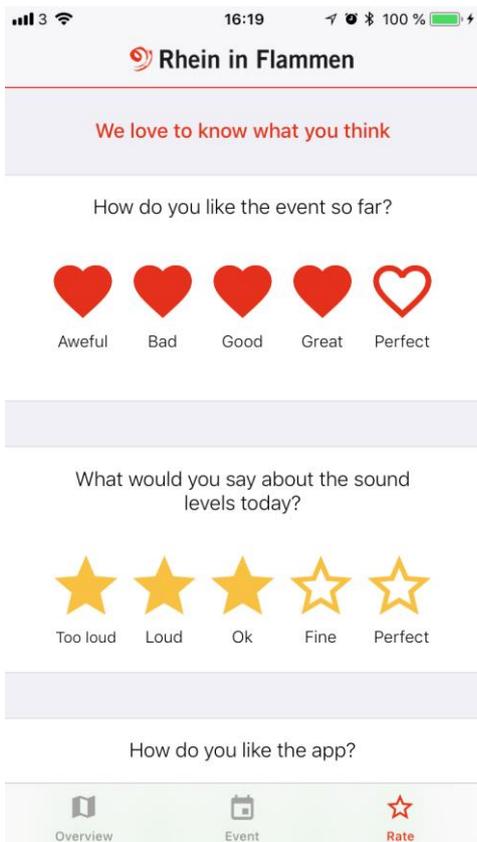


Figure 20: Screens used for visitor feedback

3.4 Missing person function included in Visitor app

The first integration between the UWB wristbands, Visitor app and the COP was achieved for the last review at Tivoli. For this the Missing person scenario was used where the idea is that a person (e.g. a child) gets a wristband (WB) that has been paired with the MONICA Visitor app, the person using the app (e.g. a parent) can now track the position of the wristband on the app and has also the possibility to report the person missing.

The following is a step by step guide of the tested scenario shown in the image below:

1. each WB gets a QR code that can be used to automatically fill in the WB Id when registering the WB. The alternative is for the user to fill the WB ID manually;
2. for the registration, the user only needs to fill in WB ID and a name, phone number is optional;
3. once registered, the user can start tracking the WB on the map in the app;
4. the user can report the tracked person missing by tapping on the red button “Report missing”
 - a. an incident/alert is created in the COP;
 - b. the DSS can provide the last known location of the WB (this has not yet been integrated with the app);
5. if the missing person is found, the user can report this by tapping on the green button “Report found”
 - a. the incident is resolved in the COP.

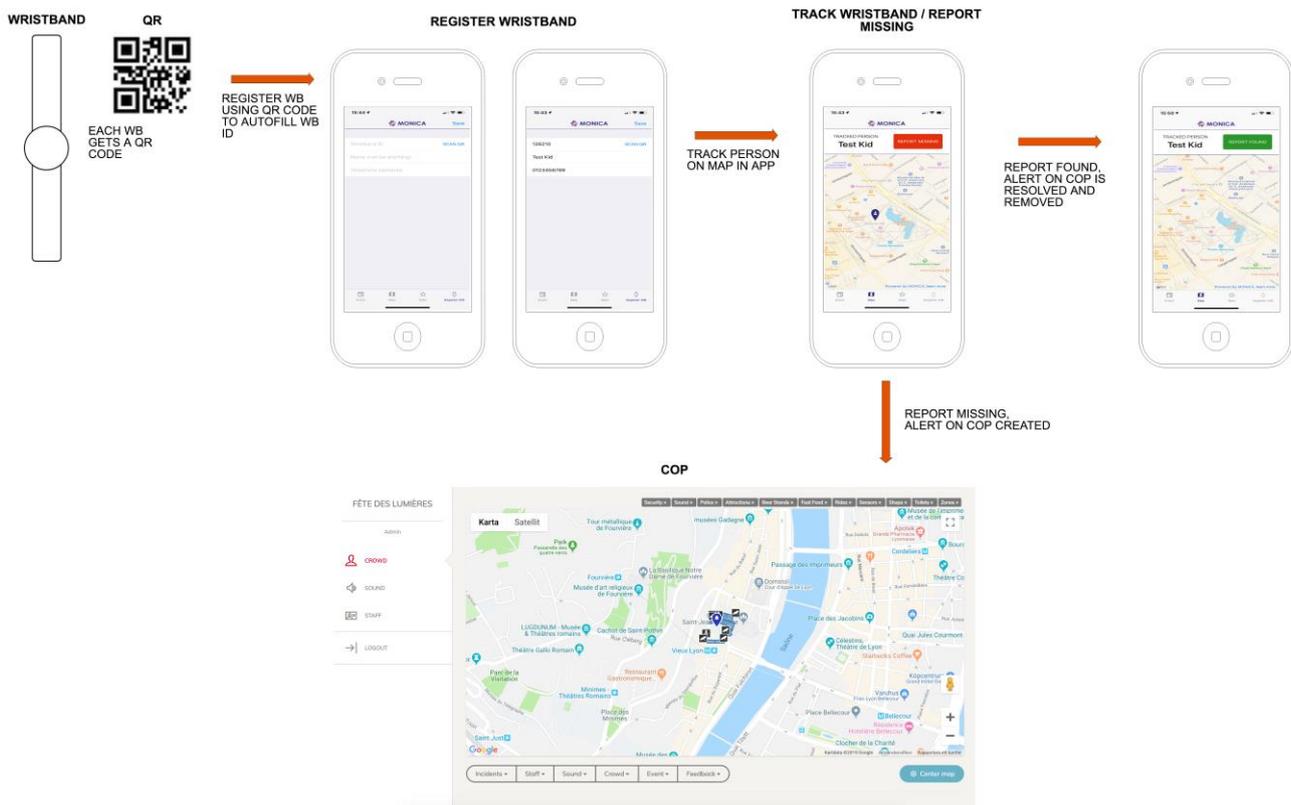


Figure 21. Missing person scenario incl. wristband, app and COP

3.5 Security app

The security app is not a public app and it is intended for event managers and security staff. The idea is to create a mobile version of the COP for staff on the ground. Figure 22 below shows a screenshot of the app from the Fête des Lumières event, with the position of staff and deployed sensors. The security app is combined with the Sound professional app described in the next section.

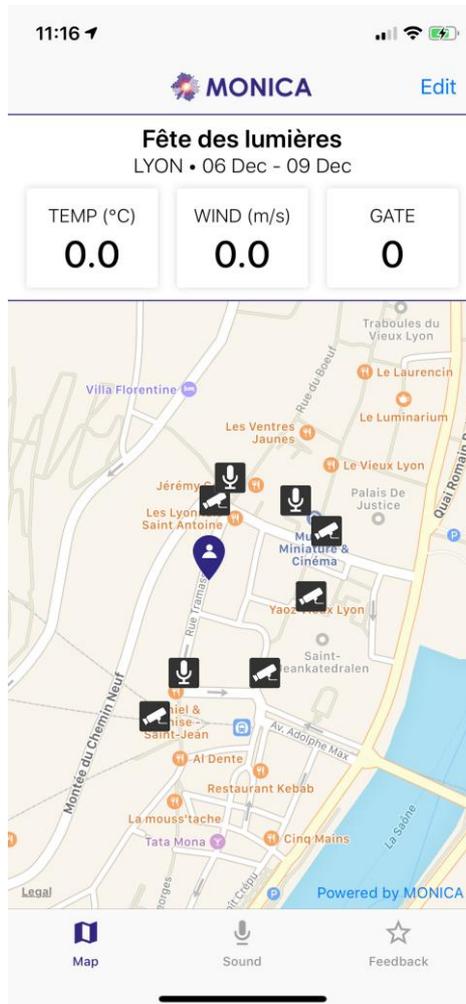


Figure 22. Fête des Lumières - security app

3.6 Sound Professional app

This app was created for sound managers, sound engineers and event managers. Where these users can follow the sound measured by the sound level meters (SLM) in real time. The app visualises 1/3 Octave spectra, LAeq and LCEq³. It is also possible to combine two SLM and compare them easily (see Figure 24).

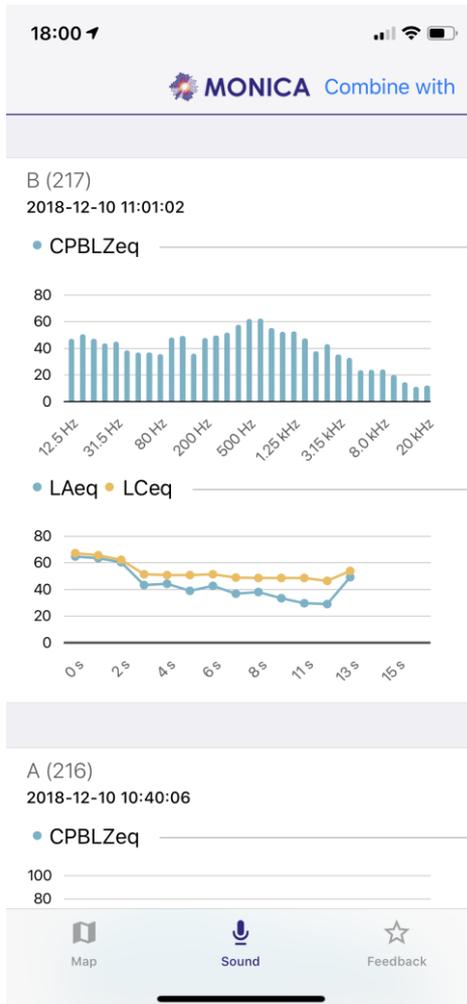


Figure 23. 1/3 Octave spectra, LAeq and LCEq for SLM B at Fête des Lumières

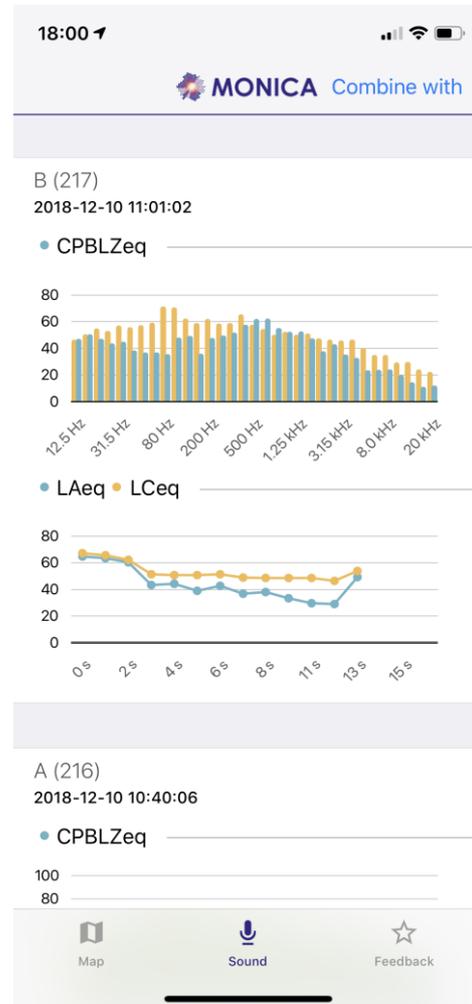


Figure 24. 1/3 Octave spectra, for SLM B combined with SLM A at Fête des Lumières

There is also a feedback function in the app that could, for instance, be used by a sound engineer on the ground to send feedback to the sound manager in the control room via the COP. The process follows:

1. to send feedback select the “Feedback” menu in app;
2. select one of the topics from the list;
3. add a value and a message;
4. a sound incident is created with the feedback and location and displayed on the COP.

³ Standard frequency correction curves (or weightings) applied to sounds in a measurement device to simulate the hearing capability of the human hearing mechanism

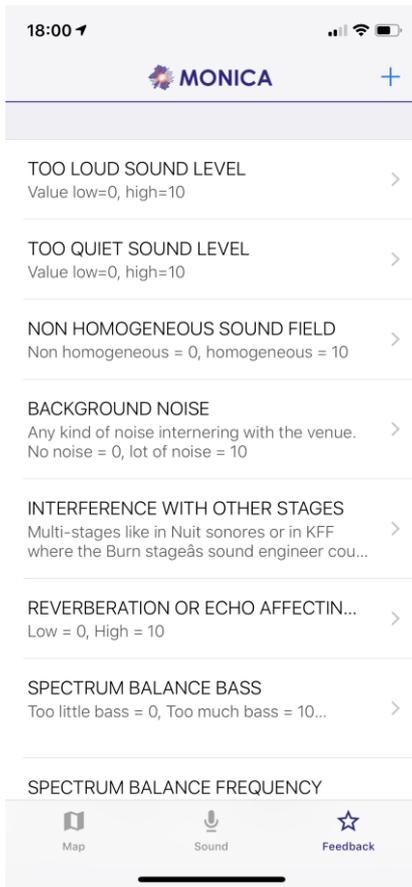


Figure 25. Sound feedback topics list

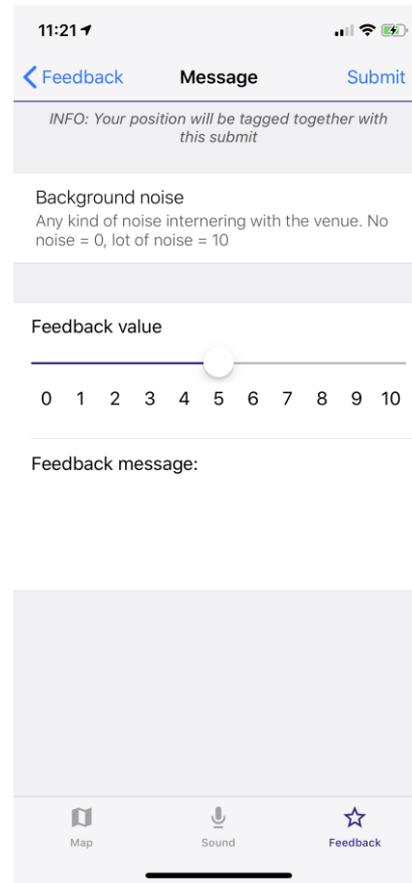


Figure 26. Sound feedback value and comment

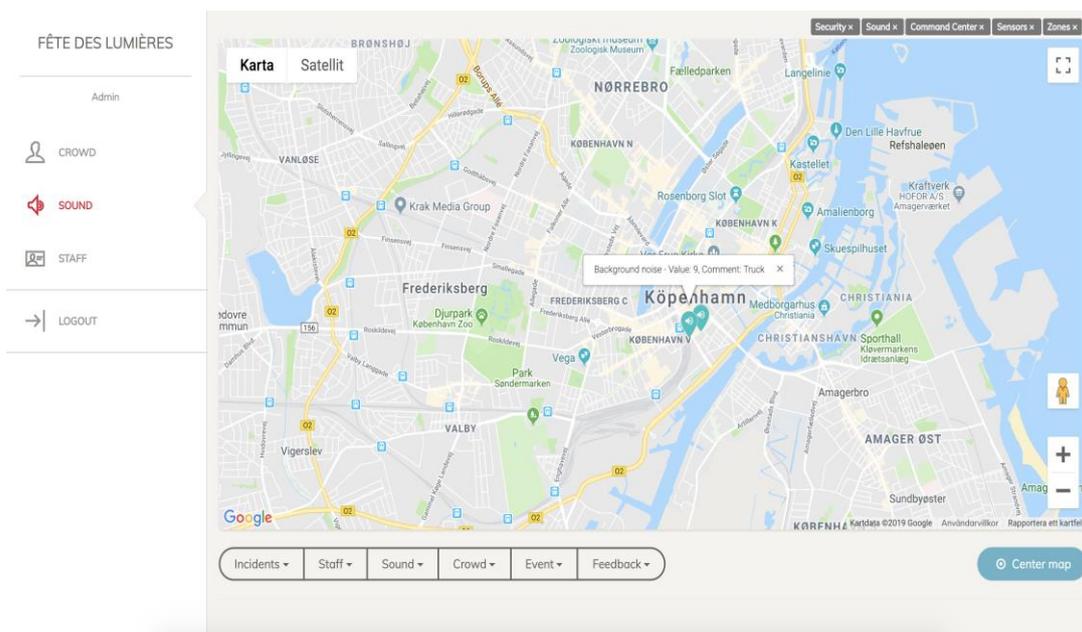


Figure 27. Sound feedback (incident) on COP

3.7 COP on mobile devices

The COP is a Web application intended for large screens, for instance a control room. But since it is implemented using a responsive design it is fully functional on mobile devices as well. Figures 28 to 31 show some screenshots from the Movida and Fête des Lumières events.

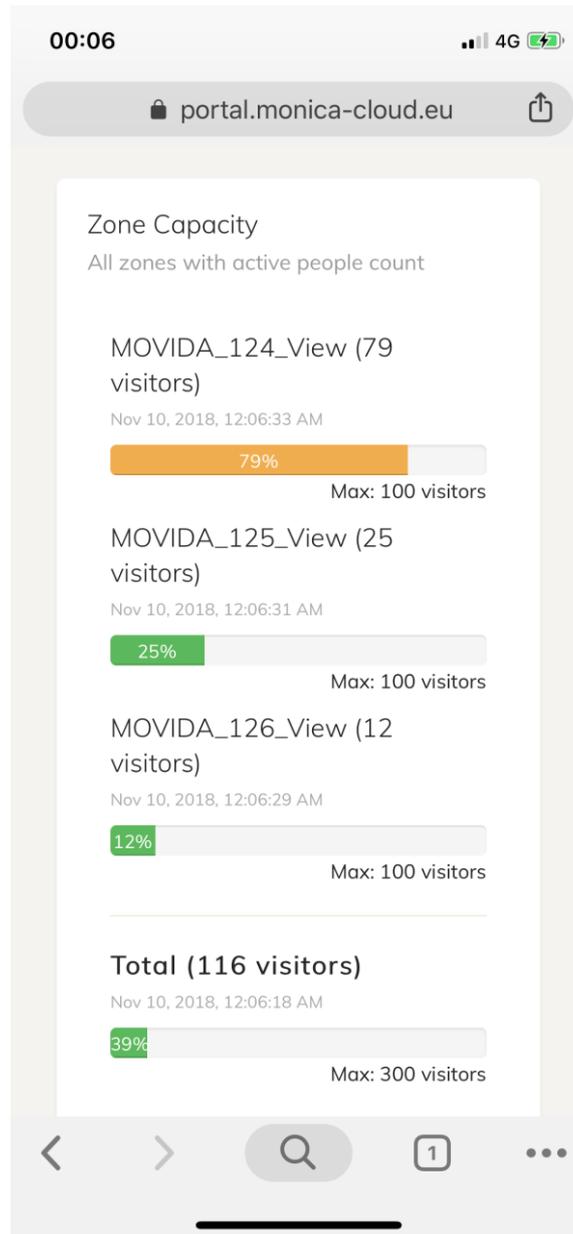


Figure 28. Movida - crowd monitor (data from cameras)

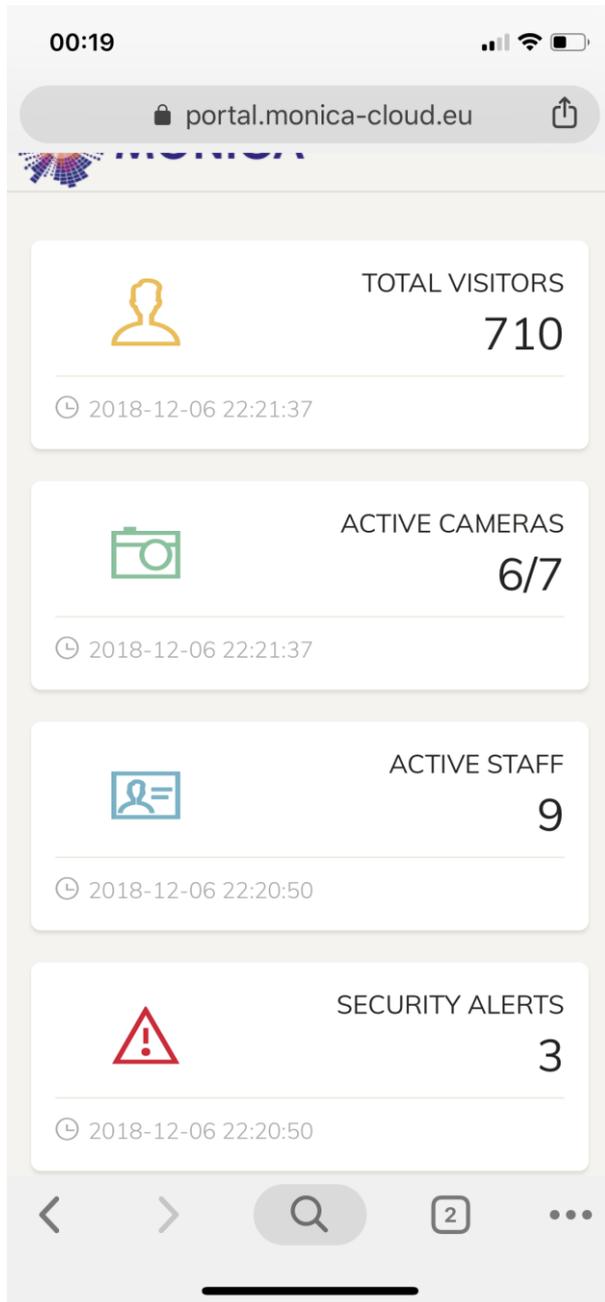


Figure 29. Fête des Lumières - overview of visitors, active cameras, tracked staff and alerts

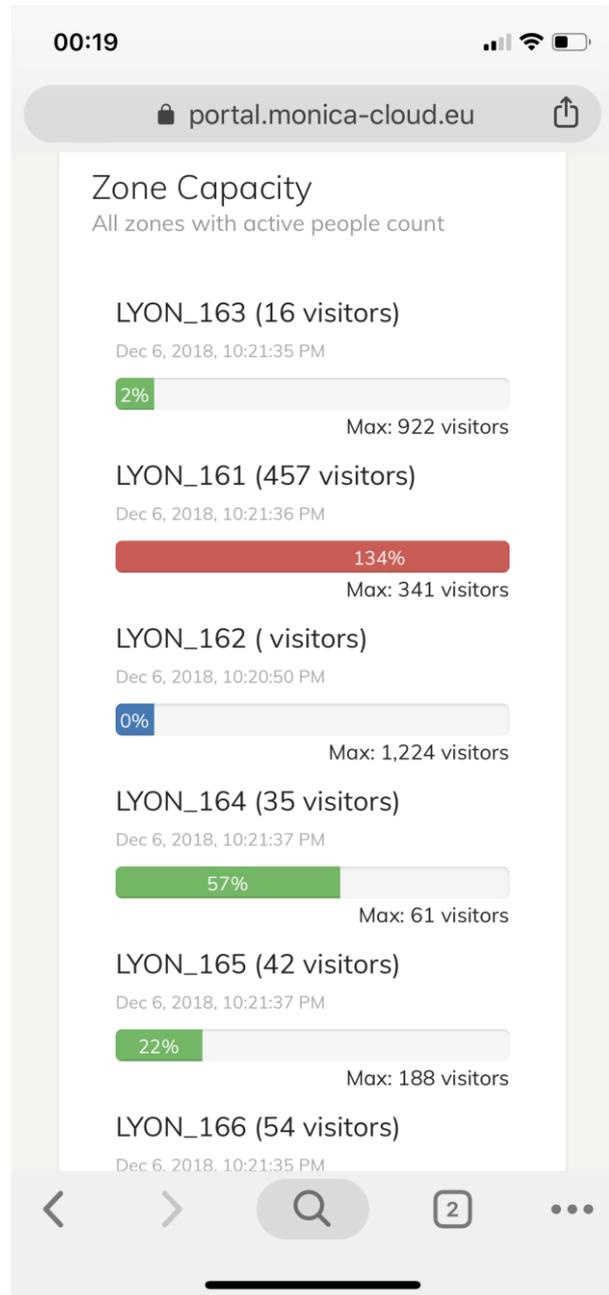


Figure 30. Fête des Lumières – crowd monitor

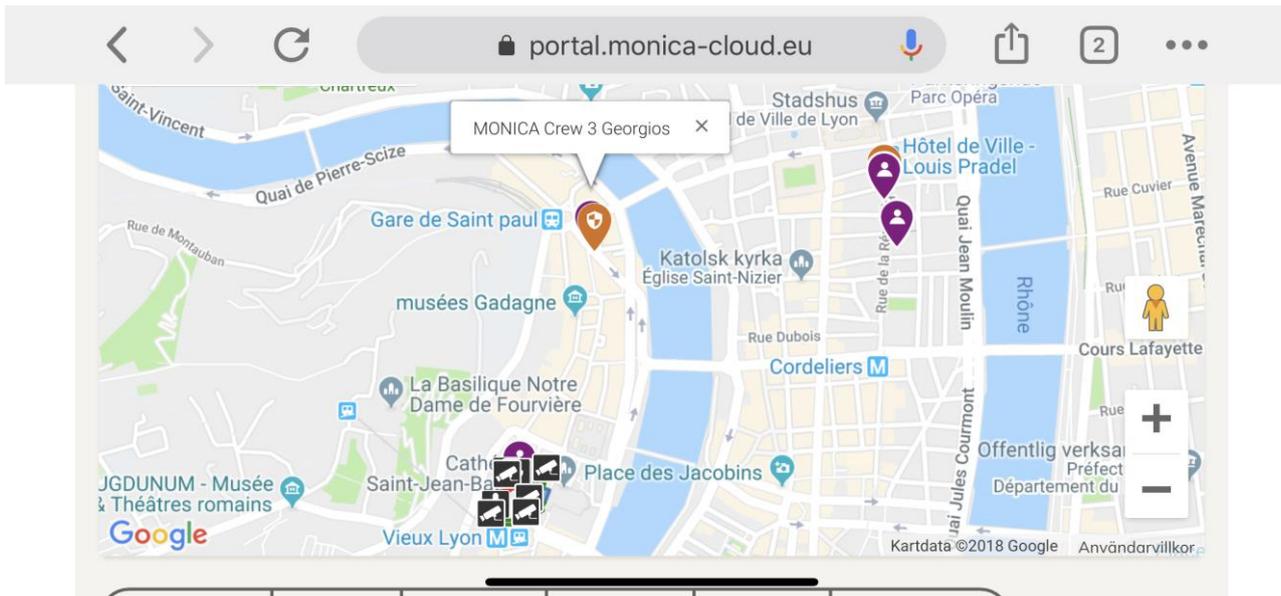


Figure 31. Fête des Lumières - sensors and staff

3.8 Development API

All the apps have been built upon the COP API as defined in deliverable D6.4 “MONICA Decision Support Platform with Common Operational Picture 2”, see this deliverable for more details regarding the API:

The API has been factorised so that the efforts to adapt the different apps to other upcoming events can be minimised, thus increasing the reusability of the MONICA apps.

4 Status and future work

The App Library is continuously being extended with public as well as professional apps for the forthcoming pilot demonstrations and for future exploitation. The library now includes a good number of apps and functions. The next focus is to distribute these in large numbers for deployment in forthcoming events. The distribution strategies are currently being defined for each event.

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