



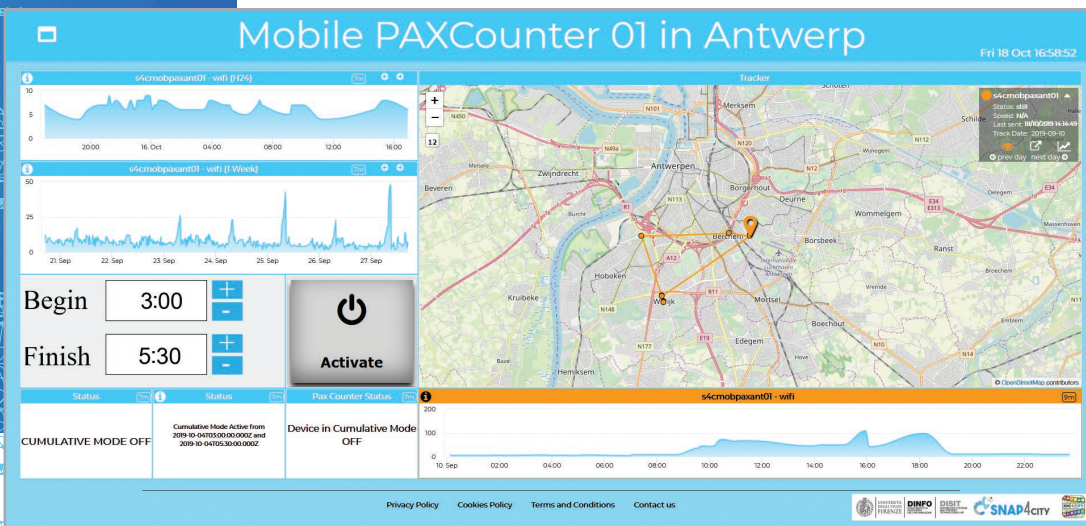
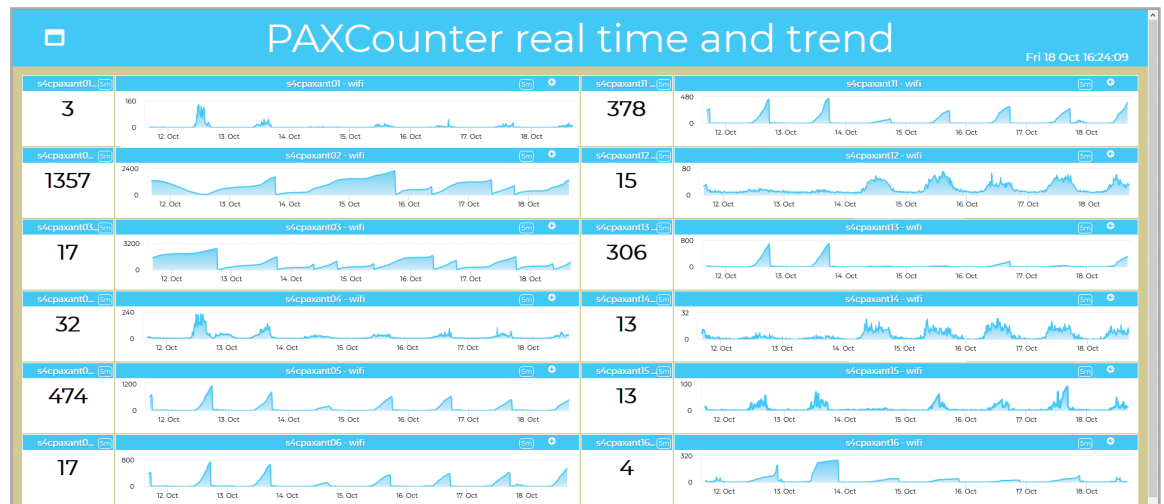
## Events and Museums Monitoring

The City Officials as well as the Museum coordinator or Sport event organizers need to monitor the number of people accessing to particular area and services. To this end, Snap4City has created a number of low-cost People Counter devices (fixed and mobile). They have been deployed in the strategic locations of the city of Antwerp in collaboration with DIGIPOLIS, Mainly in Museums and sporting areas in which events are typically held. The activity started by addressing the GDPR aspects that have been clarified with a joined effort.



This approach allowed to monitor the number of people accessing to specific part of the museum and sport area. This has been possible thanks to the fine tuning of the People Counter devices in terms of area of monitor, kind of counting (cyclic or cumulative), etc. The counting can be based on Wi-Fi and/or Bluetooth, and it is GDPR compliant.

In the figure, an example of the weekly trends of the 20 People Counter devices LoraWAN installed in Antwerp (different uplink protocols are also available). The devices can be programmed to identify distinct users in a programmable time window (e.g., opening time), or to perform counting periodically as a matter of minutes.

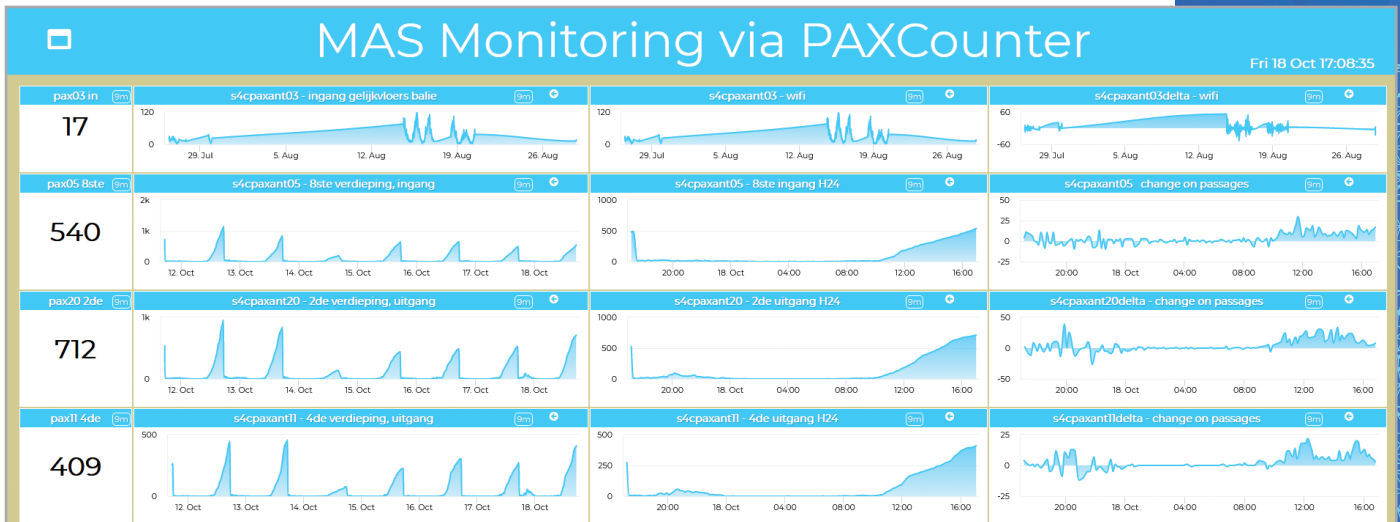


In addition, a number of Mobile People Counters has been provided. They allow to perform the counting in the move, providing GPS location with the counting. For example, to follow an event on the street or to monitor several different places. In this case, it is possible to program the counting modality directly from the Dashboard.

**IOT Devices  
for counting  
people and  
flows**

**Mobile People  
Counting  
Devices**

On all kind of PAX Counters, it is possible to attach to them other sensors before their finalization for deploy. The mobile People Counters have an autonomy of 6-8 hours depending on the connection quality.



In the museum, the devices for counting people has been profitably used for monitoring the different floors, and the people flows between different parts of the museum as in the dashboard above. All data in the dashboard are updated every 9 minutes and sent to the Gateway.

Other Antwerp Dashboards provide an overview of environmental data, people flow and hot places, safer places for bikers, etc. Heatmaps are provided for each hour and their animations of the whole day.



The Snap4 SRL has produced the PAX Counters and delivered to DIGIPOLIS Antwerp. Snap4City has developed the above presented dashboards and tools. Snap4City has been developed in the context of Select4Cities PCP. Snap4City has also developed the algorithms for data aggregation and total counting of people flows and for the remote configuration of IOT devices for counting people.

The above Dashboards are private of the DIGIPOLIS Antwerp. On the other hand, you can access to similar dashboards from the list of Public dashboards of Snap4City.org portal. On the same portal you can have additional details about how the IOT Devices for counting people works and how easy is create IOT Applications and Dashboards for data exploitation.

Other examples and connected scenarios:

- Dashboard Info: Antwerp Data Overview (Multi Data H2):  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQwNw==>
- Dashboard Info: The Life of Antwerp:  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTcwNg==>
- Dashboard Info: Antwerp Business Operator example:  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc0NQ==>
- Dashboard Info: Antwerp vs Helsinki comparison:  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc1Ng==>
- Dashboard Info: Antwerp vs Florence Comparison:  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc1Nw==>
- PAX Counters in Antwerp:  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjEwNA==>
- A mobile PAX Counter dashboard in Antwerp:  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjE2Mw==>
- Monitoring Dashboard of MAS Museum in Antwerp:  
<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjE4MQ==>
- Solution: using PAX Counters, monitoring museum and events: <https://www.snap4city.org/518>

## Monitoring Activities

## Detecting Anomalies, Adjusting the Services

**Extended version accessible from:** <https://www.snap4city.org/532>

**Contact:** <https://www.snap4city.org>

**Partners:** Select4Cities, DIGIPOLIS, Snap4 Srl