GrowSmarter
Transforming cities for a smart, sustainable Europe

FACTSHEET

Big Consolidated Open Data Platform Stockholm

PART OF SMART SOLUTION 8: BIG DATA MANAGEMENT

INTEGRATED
INFRASTRUCTURES

- Creates improved insights into people and vehicle flows within the selected geographical area as a base for future planning and decision taking
- Enables better visitor's experience by providing graphical advice based on real time data, analytics and prediction how to move in the area to avoid congestion
- Reduces emissions by providing a better individual planning solution for travel using public transportation instead of using private car

Stockholm

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What is the solution?

Understanding people and vehicle flows are fundamental to take correct decisions both in terms of individual experience when visiting the area but also to understand environmental impacts and be able to act based on this insight.

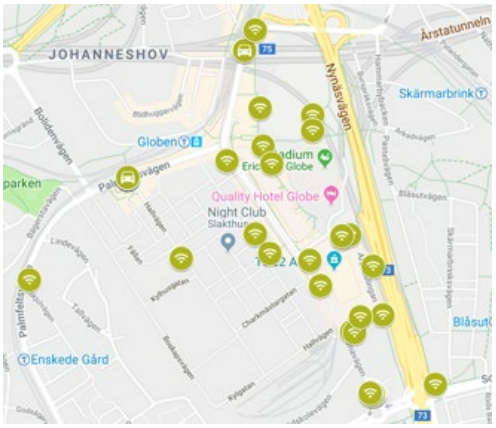
We measure flow of vehicles and people in a geographical area of Stockholm. The area has a large variety of people, bicyclists and vehicles due to several large arenas that are located within the area.

We are measuring the number of people and vehicles in the area. The aim is to understand these flows to support decision-making within the city, but also to inform the people in the area about congestions. We provide a solution for the individual visitor to better understand the current congestion situation and to receive graphical advice about the best way to leave the area with public transports. This could lead to an improved experience when visiting the area and to reduced emissions from vehicles as it would be easier to predict the travel time. This means that visitors may choose public transportation instead of using an individual car.

How does it work?

The solution uses real time data to establish information about the traffic and people flow in the local area. The data is coming from sensors installed within the area. 10 of these sensors identify vehicles from the registration plates.

This information is used to connect to the Swedish Transport Agency to access technical specifications of the passing vehicles in order to calculate its emission impact. A further 23 sensors identify wi-fi (wireless) devices.



By tracking movements from sensor to sensor, a pattern of movement can be established as well as the volume of moving devices. This can be used to predict people flow within the area.

The devices are most frequently mobile phones but can also be other devices and vehicles sending out wi-fi signals. By filtering the signals from unwanted devices, the quality of the measurements are improved.

The final source of data is local weather data that is stored in the platform and can be used in specific use cases where weather has an impact. For example for predictions of people flow changes based on weather conditions. The weather data comes from The Weather Company.

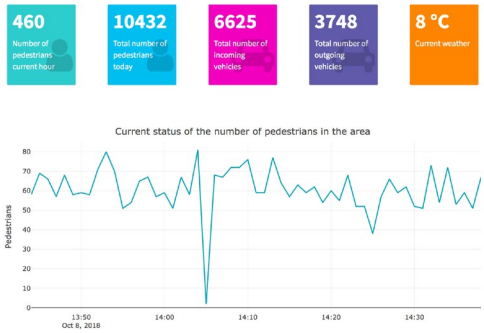
The platform used to collect all sensor data and weather data is the IBM Cloud Platform which includes an IoT (Internet of Things) connection. It connects a wide range of sensors and data sources. It can also manage high volumes of data.

The data input is stored in a data lake where it can be refined as needed. The data stored in the platform is anonymized and cannot be used to identify individuals.

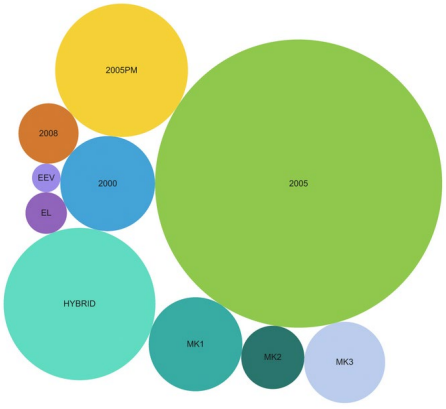
Output from the platform can be tailored to different needs and user groups. This can range from customized advanced analytics to preconfigured dashboards. The data can also be used for mobile applications and for external systems using API's (Application Protocol Interfaces).

An important design goal was to establish an open architecture where multiple input and output sources can be used and that these could be flexible over time. It was also important to enable advanced analytics as part of the solution. Overall the setup supports real time input of data streams, storage of data, advanced analytics and different uses of the data.

One example of a presentation of data is included below. This shows in the upper part the number of people currently in the area, the total number of people during this day, the number of vehicles entering the area, the number of vehicles leaving. In addition and the current temperature. In the lower part the number of people present over time is displayed in a graph.

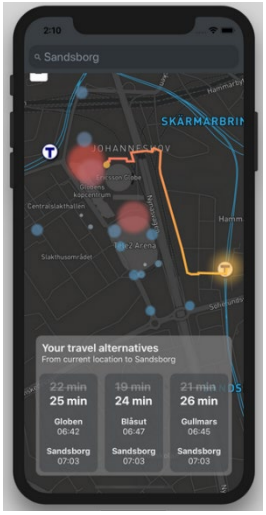


Another example is the calculation of the vehicle environmental impact, both for the total number of vehicles present and each vehicle's individual environmental impact as seen in the graph below. The bubbles size corresponds to the number of vehicles while each bubble's color represents a different type of fuel. The largest bubble shows that petrol is the most common fuel. One of seven vehicles are using a hybrid solution.



MetroLIVE: The purpose of the MetroLIVE application developed in the project is to help visitors plan their trip based on the current situation in the area with special attention to the potential crowd issues in the arena area.

The application is based on the existing public communication authority's API (SL) but adding congestion and a heatmap of the number of visitors on a map that also



displays estimated walking time based on this congestion.

The application provides the visitor with different trip alternatives for leaving the venue including travel time, based on predicted walking time to the most suitable public transportation starting point adding, total time to the final destination but also congestions in the area and a prediction on how the situation will develop.

Expected Impacts

Improved understanding of people and vehicle flows will enable decision makers to take well informed decisions. Examples of information and insights that will be available include:

- Number of vehicle passages
- Number per vehicle type
- The volume of bicyclists and pedestrians
- People flow in different type of events and situations
- People movement patterns
- How long people and vehicles stay in the area
- Detection of traffic congestion
- Emission calculations
- Weather impact on people flow and traffic in the area

Helping visitors understanding the impact of people crowds, we expect an improved experience in visiting the area. It will also positively impact the number of people that select to travel with public transport instead of with a car, reducing the overall emission impact in the area.

The possibility to open the data for external parties' use will have another impact, stimulating further innovation. By connecting more data sources to the already existing platform, for example additional multi sensors (camera sensors), the insights and use can also be expanded.

Potential for replication

All technologies used in this project are widely available. The cloud platform and weather data input can be used regardless of location. Sensors already installed can be used. If no sensor data are available, sensors must be installed to replicate the solution. Big data and connected devices are getting more common. This project has aimed at showing a real example of how these could be used

Replication criteria:

- The number of data sources are expanding rapidly. It is important to use open data platforms which are designed to be flexible in terms of input, output and the ability to manage big data over time in a secure and safe manner
- Sensitive data need to be anonymized
- Data ownership is important and should be a decision criteria
- Implementation of new sensor systems can take time due to approvals needed and the need for connectivity and electricity
- Different sensors have different characteristics that can limit their suitability for the intended use.