



Kapsch TrafficCom

***Intelligent mobility
in Madrid. Real-time
data collection and
analysis.***

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Introduction

Traffic planning to meet current and future mobility demands.

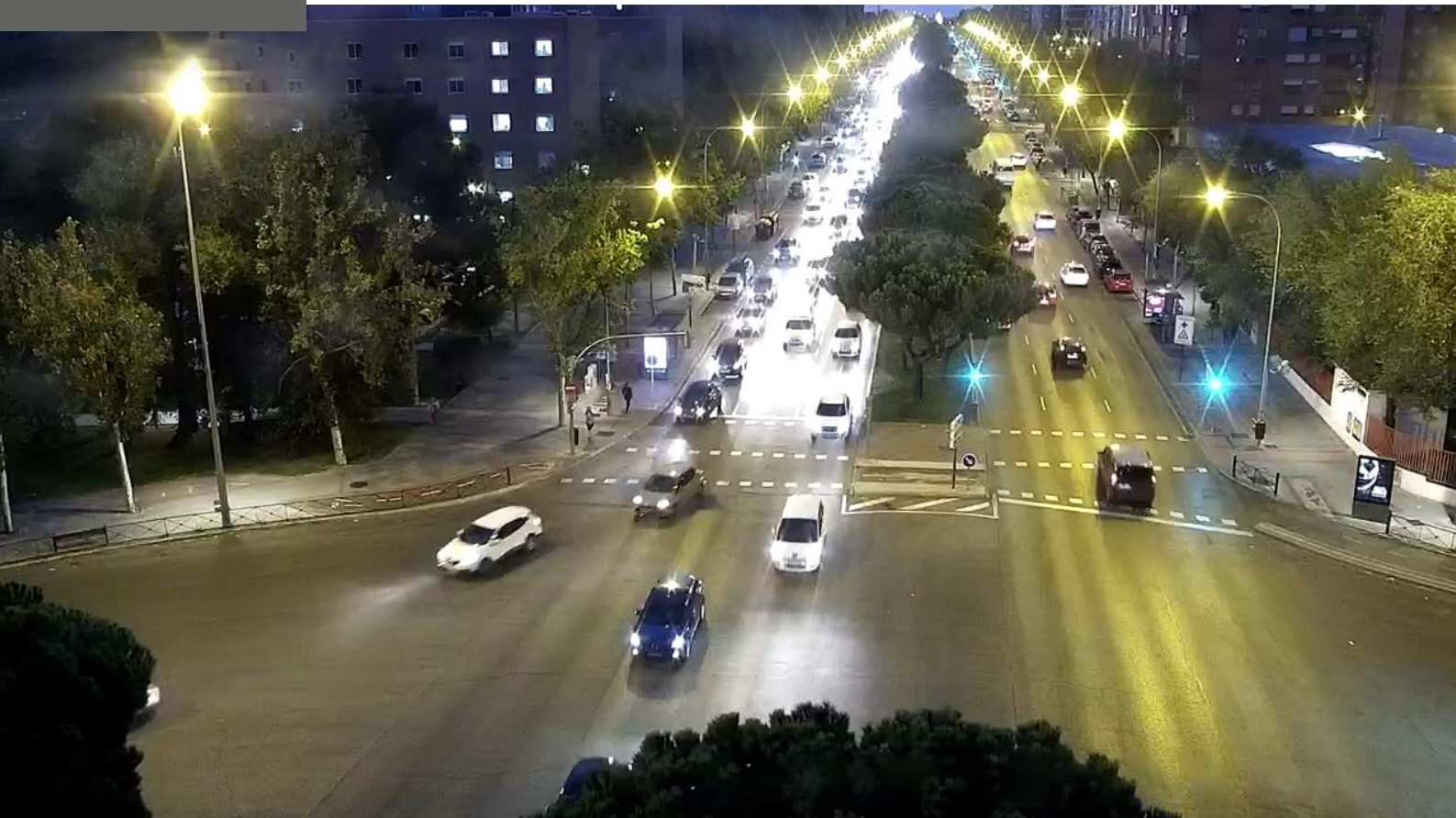
Madrid's City Council has relied on Kapsch's technology and services to obtain and process the city's mobility data. It's an innovative project that's based on the use of cutting-edge technologies.

To perform the city's traffic planning, its Technical Services Dept needs access to reliable data on the transit of vehicles, bicycles and pedestrians as well as other means of transport. This way it is possible to respond to present and future mobility demands.

This contract has strengthened the relationship between Kapsch and Madrid's City Council. Another long-term contract is currently in force for the provision of services for the following services Maintenance and Operation of the City's Traffic Control Systems of the City.

It's a relationship that goes back 30 years, and throughout this period Kapsch has uninterruptedly provided Maintenance and Traffic Operation services in the City of Madrid. Over the years, the company has developed and implemented state-of-the-art traffic control equipment and strategies, in order to meet the city's mobility challenges.

One of the main streets on the East part of the City, where Kapsch technology is present.



Background

A City that's committed to improving mobility, and reducing congestion, pollution and accidents to become more sustainable city.

Technology is a key.

In terms of traffic control strategies, the city has made a firm commitment to foster technology renovation and to implement new traffic management tools as a way to improve mobility. This way, the Council is working on reducing congestion and pollution, as well as the number of accidents to become a more sustainable city.

Improving data quality.

On the other hand, planning and data collection in real time play a fundamental role in the implementation of mobility management strategies.

In the past, there were a multitude of independent contracts for each type of data, where the human component played an essential role. The information was sometimes collected on paper, under the risk of loss, deterioration misinterpretation. There weren't enough data collection stations and those available lacked state-of-the-art technology. Besides, there weren't any stations to measure pedestrians or bicycles.

In addition, the collected data had to be processed on management platforms that lacked the technology needed to process it, compare it, analyze it and present it graphically so the Planning Department could make the right decisions.

View of Paseo de la Castellana, the main corridor that crosses the center of the city from north to south.



Challenges

To reduce congestion and pollution, and improve the road users' experience by reducing travel times.

The main objective of the City Government is to minimize congestion, reduce pollution and risks to public health, as well improve the road users' experience by reducing travel times.

Reducing levels of air pollutants such as NO2 is key to meeting the requirements established by the European Union.

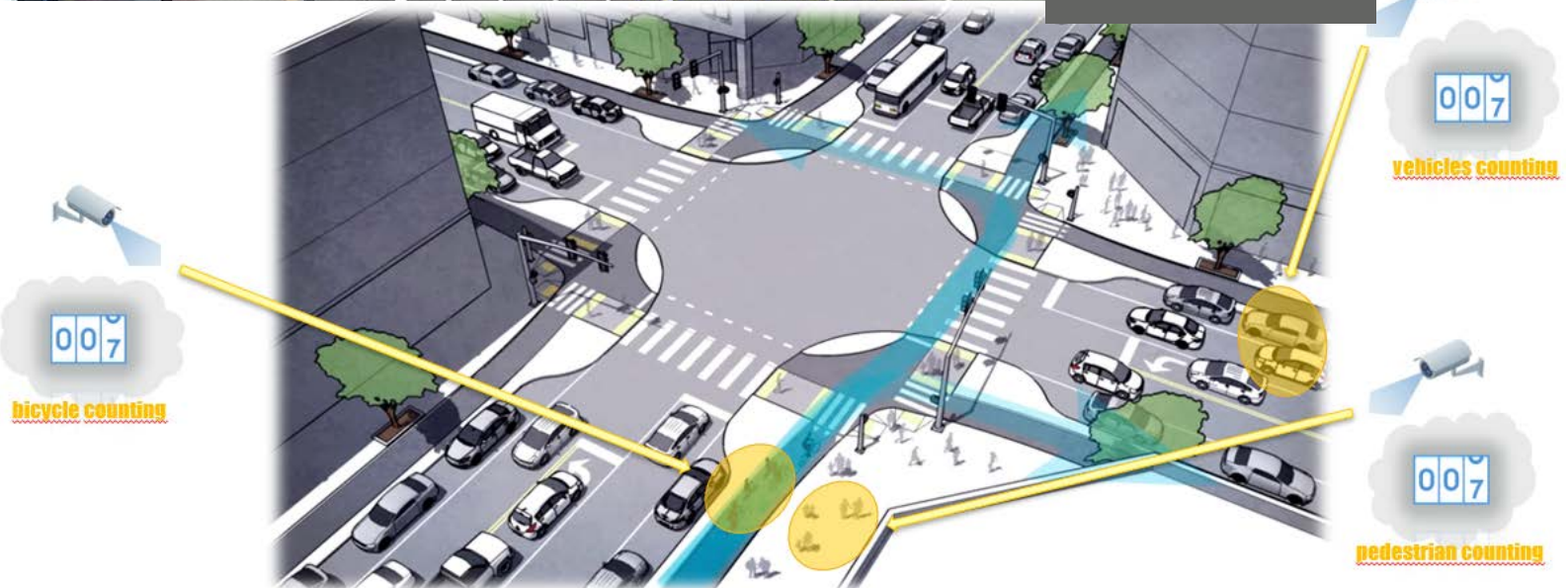
The City faces the challenge of not having enough information to analyze and evaluate future improvements to the mobility planning. Additionally, the data obtained so far is not entirely reliable.

New sources of information are needed, not only for vehicles, but also for pedestrians and other means of transportation. And the data collected must be reliable and of high quality in order to be validated.

This situation requires technology renovation, as well as state-of-the-art equipment that can collect reliable data, which can then be processed by using Big Data and Artificial Intelligence (AI) techniques applied to mobility use cases.



Artificial vision techniques are used to count vehicles, pedestrians and bicycles.



Solution

A platform to collect and process information from multiple sources and provide a real picture of mobility in Madrid.

This solution is based on the implementation of the EcoTrafIX software platform. The integrated system allows for the collection of data from multiple sources obtain the real status of mobility in Madrid.

It enables measurements at critical points with various sensors, as well as specialized and customized software. It also allows for continuous monitoring of the entire road network, including not only the transit of vehicles but also of other means of transportation, as well as pedestrians.

In addition to this data collection and processing contract, Kapsch provides the City of Madrid with some complementary solutions for traffic improvement. An example is the adaptive traffic light control systems (ITACA), installed by Kapsch in different corridors in Madrid, which adjust the traffic lights timing according to the flows and traffic jams at any given moment.

ITACA Process Flowchart.

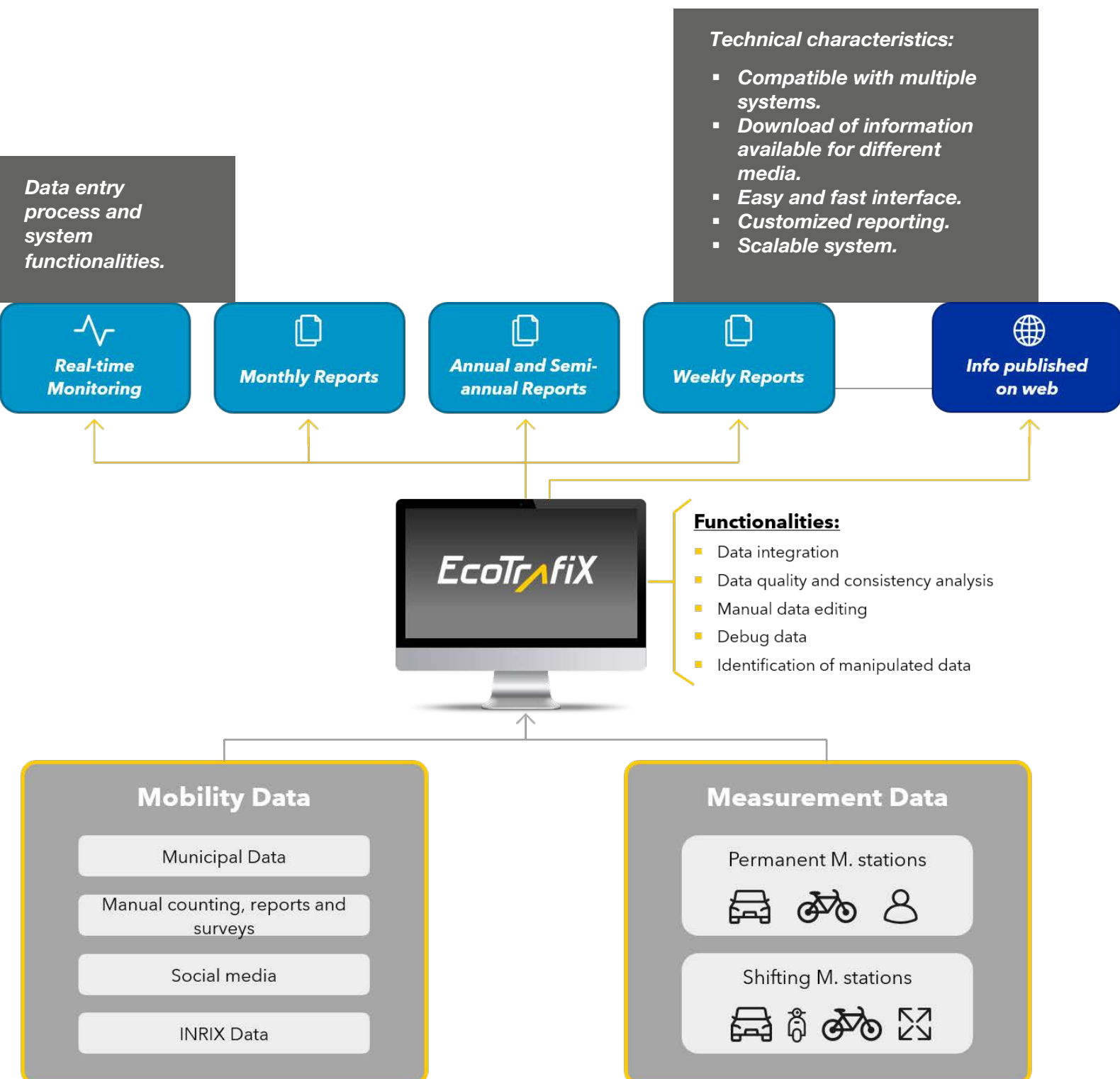


System Architecture

Modular architecture that ensures full integration of data and systems.

EcoTrafIX is a platform that has a modular architecture, which enables the integration of various systems and data. The solution is designed to capture, aggregate, archive and monitor the data from various sources.

It makes it possible to combine multiple data sources in real time, from the traditional count stations to the most advanced ones, based on real-time image analytics, specific campaigns, fleets and police information, among others. Additionally, technology for counting bicycle and pedestrians is included in the equation, based on video analytics through thermographic cameras and sophisticated calculation algorithms.



Unique Features

The data collected is obtained through different technologies.

Different technologies are used depending on the type of data.

- Counting vehicles going on each direction, with cameras and image processing through video analytics.
- Vehicles measured by cameras with virtual loops for permanent measurements and pneumatic tube counting for specific ones.
- Pedestrian counting using thermal and facial recognition equipment.
- Bicycle analysis using cameras with a sensor and integrated thermal detectors.
- Recording of travel speeds and origin-destination matrices using big data tools.

The permanent counting stations are independent, autonomous and communicate via 4G network. The data collected are integrated into the EcoTrafiX platform, which also incorporates data from external providers of the City Council itself or free access sources. The required information is subsequently displayed on a scorecard.

The data collected are obtained through different technologies.



Unique Features

Integration and customization of new services.

New Systems and Services.

The solution deployed combines dual measurement systems with complementary systems that evaluate the quality of complex data, such as bicycles circulating in lanes that are common to other vehicles.

In order to ensure the reliability and stability of the installation, the project has been equipped with its own 4G network, which has improved the existing data transmission speed.

The new systems deployed allow for a faster, more reliable information processing with less need for manual intervention.

New services have also been integrated and customized allowing to visualize data and provide a Business Intelligence oriented user experience in order to collect, process and present information from different data sources (Big Data: databases, files, etc.) that are processed from a process management platform.

***Vehicle counting
by a camera with
integrated
analytics.***



Conclusion

Improving the quality of life for citizens.

Mobility managers' decision making when planning traffic and road infrastructure is now based on a multitude of reliable data validated by management tools.

These tools have simplified the work of City technicians by providing automated processes; they are now supported by dashboards for more efficient decision making. For example, the system can be used to detect unusual low speeds on certain roads, which will require the implementation of plans to reduce traffic jams and, therefore, pollution.

In addition to this contract, the Madrid City Council has opted for a pioneering service contract model in Spain, also executed by Kapsch, which relies on the use of new sensing technologies and a management tool that allows for the collection, validation and display of data.

The data must have high quality, and be auditable and measurable. Analysis and improved analytics will be decisive for the intelligence of any business, data platform and machine learning. More and more, City planning managers will be able to make decisions that contribute to the improvement of mobility in their city.

Alcalá Street is one of the main corridors of the city, with 11 km.



Perspective

Mobility planning based on reliable information in Madrid, which will continue to improve in the future.

Currently, we work with state-of-the-art equipment, applying counting analytics and improved algorithms. All sensors and equipment are integrated into networks that have been previously studied and analyzed according to their relevance for the city's mobility. Counting vehicles and/or pedestrians, and accurately counting bicycles at the main points of the city allow for the analysis of current and future travel trends, and enables managers to make mobility planning decisions for the entire city.

A large number of streets in the city of Madrid have measuring devices installed, although the number may increase or change over time in order to strengthen, improve and consolidate the reliability and data collection.

A factor to be taken into account for the renewal or improvements of the measuring equipment will be the quality of the data obtained, which is essential when analyzing the needs of an avant-garde city like Madrid.

The use of state-of-the-art sensors and measuring equipment will be analyzed, and additional sources of information may as well be added, both external and from the City Council itself, to complement the mobility analysis.

Madrid will continue to grow in the future and it will be necessary to plan mobility with improved reliable information. For this, tools such as EcoTrafIX will be necessary, which will allow for the total automation of processes and, along with Artificial Intelligence tools and Big Data processing, will contribute to improve mobility.

Intersection of Paseo de la Castellana with Calle de José Abascal.



Looking to the future

We're convinced that the future of mobility in cities will rely on the implementation of holistic management systems that adapt mobility strategies at all times, thus responding to the needs of citizens at any given moment.

Within our integrated vision of mobility, we hope to be able to collaborate in the future with other public and private administrations in order to reach a state of collaboration between them, sharing and taking advantage of the information between the parties involved, making mobility safer and more.

“Technology development is fundamental to the transformation of the city”.

Interview with Borja Carabante,
delegate of the Environment and
Mobility Area of the Madrid City
Council



Kapsch TrafficCom

Kapsch TrafficCom is a globally renowned provider of transportation solutions for sustainable mobility. Innovative solutions in the application fields of tolling, tolling services, traffic management and demand management contribute to a healthy world without congestion.

Kapsch has brought projects to fruition in more than 50 countries around the globe. With one-stop solutions, the company covers the entire value chain of customers, from components to design and implementation to the operation of systems.

As part of the Kapsch Group and headquartered in Vienna, Kapsch TrafficCom has subsidiaries and branches in more than 25 countries. It has been listed in the Prime Market segment of the Vienna Stock Exchange since 2007 (ticker symbol: KTCG). In its 2020/21 financial year, around 4,660 employees generated revenues of about EUR 500 million.

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