

A nighttime photograph of a city skyline, likely Dubai, featuring numerous illuminated skyscrapers and a complex highway interchange. Light trails from traffic on the highway create a sense of motion. A large, diagonal yellow graphic element is overlaid on the left side of the image.

Kapsch TrafficCom

Traffic Intelligence

Working towards facilitating easy access to data management and data analytics, while fostering connectivity


Introduction

Traffic Intelligence

The mobility landscape is undergoing a significant transformation due to societal changes like environmental concerns, evolving consumer behavior, the rise of micro-mobility, and the "anything-as-a-service" model. Technological advancements, including the integration of mobile devices, easy access to information, data processing capabilities, cloud services, artificial intelligence, and the growth of connected vehicles (4G/5G and communication protocols like CV/C-ITS), are driving this paradigm shift.

This transformation has given rise to the connected mobility ecosystem, impacting traffic and mobility management for authorities. Two key challenges emerge: First, traffic and mobility management is no longer a simple unidirectional communication process. The traditional approach, where public authorities directly managed infrastructure and services, has evolved into a more complex scenario. Now, public authorities collaborate with various stakeholders such as B2C transportation services, navigation apps, car manufacturers (OEMs), data brokers, startups, and tech companies, forming the intricate web of the Connected Mobility Ecosystem.

As traffic management evolves, the focus shifts from physical infrastructure to effective data management and analysis. Establishing connectivity with external stakeholders and drivers becomes crucial for efficient operations. Public administrations face a dual challenge: "navigating their role in this ecosystem to maintain effective traffic and mobility management while seizing opportunities to enhance overall mobility planning and operations, especially in the context of traffic management."



Kapsch accumulates expertise and capability across the full mobility management spectrum.

Background

Connected Mobility in constant evolution

The increasing influence of the connected mobility ecosystem on traffic management is evident through several key points:

The Era of Connectivity

Approximately half of all global vehicle sales involve connected vehicles, exceeding 90% in many European countries and North America. This realization of the vehicle-as-sensor concept is reshaping the mobility landscape.

Bringing Data Together

Original Equipment Manufacturers (OEMs) have established data platforms to collect information from connected vehicles. A resulting data marketplace allows companies to monetize data, enhancing use case development and analytics.

Navigation Support

Around 75% of people rely on navigation apps, especially during congestion, emphasizing the practical use of the vehicle-as-actuator concept (Source: Kapsch TrafficCom 2020 Index).

Dynamic Market

Investment in mobility startups surpasses the average growth rate in other industries, reflecting the growing importance and dynamism of the mobility market.

Game Changers

Advancements in autonomous driving technologies significantly contribute to the transformation of the mobility landscape.

The Value of Data

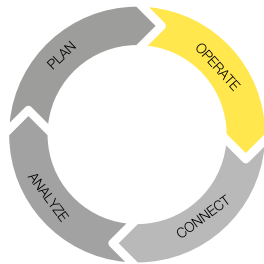
Legislative focus has shifted towards recognizing the value of data in mobility management. Initiatives like ITS directives, investments in Data Spaces in Europe, and similar efforts in the United States underscore the identification of mobility as a strategic sector.

In light of the evolving connected mobility ecosystem, public administrations must embrace innovative solutions. Adapting to this changing environment is crucial for a positive impact on traffic in cities and regions. Leveraging emerging trends and technologies, such as intelligent transportation systems, data-driven decision-making processes, and agile policies, enables public administrations to optimize traffic management. Through these approaches, they can enhance traffic flow, reduce congestion, improve safety, and promote sustainable transportation options.

Challenges

A call to improve Urban Mobility

In general, the responsibilities of traffic managers can be grouped into four main categories: Plan, Operate, Connect (with road users and stakeholders), and Analyze results (for feedback and process improvement). These blocks are interrelated, with information analysis being crucial for effective planning, operation relying on preplanned procedures and responses, and connection and communication playing a key role in operational success.



An initial examination of these responsibility blocks reveals that traffic intelligence and data management directly apply to all four aspects. This presents an initial challenge in efficiently managing and analyzing data to enhance traffic management across all areas.

In the dynamic landscape of traffic and mobility, traffic management agencies and administrations face various challenges related to the management and use of data:

1. Efficiently managing a large volume of potentially heterogeneous data from various sensors and systems, internally and externally, ensuring organized and controlled sharing for connectivity.
2. Extracting valuable insights from data to drive real improvements.
3. Adopting a data-driven decision-making methodology to enhance planning processes.
4. Proactively addressing congestion and minimizing the impact of incidents through predictive analytics and automation.
5. Optimizing management and increasing efficiency in the face of limited resources and investment capacity.

Kapsch TrafficCom focuses on these challenges as opportunities within the Traffic Intelligence concept. Through innovative solutions, Kapsch TrafficCom aims to improve traffic management, empowering agencies to have a positive impact on traffic in cities and regions.



“The challenges in traffic management include data handling, actionable insights, data-driven planning, proactive congestion management, and resource optimization.”

*Aritza Aldama, Product Manager,
Kapsch TrafficCom*



Solutions

Revolutionary Technology for present and future Mobility challenges

Kapsch TrafficCom's products and services in traffic management effectively turn challenges into opportunities for enhancing traffic and mobility. The previously outlined challenges align directly with Kapsch's Traffic Intelligence solutions.

A Custom-Designed Data Hub Optimized for Handling Traffic and Mobility Data

Kapsch TrafficCom offers a specialized data hub tailored for efficient management of large data volumes in traffic and mobility. This comprehensive data hub comprises infrastructure, software components, and data models, enabling seamless management and sharing of real-time and historical data. Key use cases include data integration from diverse sources through open APIs, controlled data consumption, storing and managing historical repositories, and facilitating data governance through a data catalogue and security management.

Extracting More Value from Data

To extract value from the available data, whether from agency sources, external stakeholders, partners, or connected vehicles, a common reference system is essential. The Kapsch TrafficCom datahub utilizes a unified traffic network and mapping system, streamlining data linkage to a reference point and standardized storage. It covers various data types like traffic data, event and incident data, weather data, and floating car data.

In addition, ensuring data quality is crucial for meaningful results. The datahub addresses this by incorporating a dedicated solution for reviewing and enhancing data quality. Harmonizing quality data to a common reference point and adopting a standardized data model enables comprehensive analysis, from historical assessments to advanced analytics like predictive model training and machine learning.

Empowering Data-Driven Decision-Making

Once data is appropriately managed and linked to a common reference system, Kapsch TrafficCom provides a range of data analytics use cases called Insights. These empower enhanced traffic planning, encompassing descriptive analytics to diagnostic analytics, offering a profound understanding of managed infrastructure, impacts, and root causes for data-driven planning.

Insights also facilitates the analysis of traffic and mobility demand, providing understanding of real demand and its evolution. In real-time scenarios, streaming travel times offer a traffic status view. Machine Learning technologies enhance planning by automatically analyzing traffic data to derive behavior patterns and identify historical anomalies, facilitating understanding of traffic patterns and scenarios. This information can be combined with planning tools like simulators and traffic engineering tools.



Proactive Traffic Transformation: Predict, Detect, and Auto-mate for Smoother Mobility

Kapsch TrafficCom's solution transforms reactive traffic operations into a proactive approach, minimizing congestion and mitigating the impact of unexpected incidents and planned events. Built on three pillars—prediction, early detection, and process automation and analysis—it utilizes machine-learning-based time series data prediction models for both traffic and mobility data. Specifically tailored for urban environments, this allows proactive actions based on anticipated behaviors.

Early detection is enhanced through connectors integrating information from connected vehicles and drivers (e.g., Waze). Machine-learning technologies create anomaly detection models to identify significant deviations. Automation integrates information with the traffic management system (ATMS) and includes a Decision Support System (DSS) with an internal rules engine, streamlining traffic management operations.

Scalable and Open Traffic Management Solutions for Long-Term Success

Kapsch TrafficCom's Traffic Intelligence solutions empower agencies with ambitious long-term visions for traffic management improvement, offering a gradual and flexible approach. By starting small and adapting to initial needs, agencies can easily embark on their transformative journey. As they progress, Kapsch TrafficCom's solutions seamlessly scale, accommodating evolving requirements, increasing data volume, and expanding use cases, ensuring effective achievement of long-term goals.

Scalability and openness are crucial considerations. Kapsch TrafficCom leverages cloud computing, ensuring the solution can grow as needed. Functional scalability is guaranteed through modern concepts like continuous integration and delivery, supported by DevOps practices, promoting continuous improvement and security. Emphasizing openness, Kapsch TrafficCom provides APIs and data models, fostering the expansion of the data platform ecosystem by connecting new sources, consumers, and generating custom dashboards, among other possibilities



Benefits

Data-driven decisions for a dynamic Mobility

Kapsch TrafficCom's Traffic Intelligence solutions bring a range of benefits to public agencies managing traffic in evolving mobility landscapes. By utilizing data, connectivity, and collaboration, agencies optimize traffic management in cities and regions. Kapsch TrafficCom's solutions address challenges through specialized data management, allowing seamless integration and sharing for valuable insights and data-driven planning.

Predictive capabilities and early incident detection enable a shift from reactive to proactive operations, minimizing congestion and unexpected impacts. The scalability and openness of Kapsch TrafficCom's solutions allow agencies to start small and grow progressively, aligning with their long-term vision for traffic management improvement.

This transformative approach empowers public agencies to make data-driven decisions and effectively enhance traffic flow, safety, and sustainability.

Upon examining the specific advantages of Kapsch's Traffic Intelligence solutions for different user personas, the following benefits can be highlighted:

For planners, traffic engineers, or managers:

- Conduct comprehensive data analysis to gain insights into both the occurrences and the underlying reasons, enabling data-driven decision-making.
- Access a broader range of information by integrating data from various sources, enhancing planning capabilities.
- Utilize machine learning technologies for advanced analytics, simplifying the extraction of valuable insights.
- Acquire a deeper understanding of traffic and mobility demand and tailor analytics to specific needs.

For traffic operators:

- Seamlessly integrate Traffic Intelligence functions and use cases into their existing Advanced Traffic Management Systems (ATMS).
- Access more comprehensive and relevant information for informed decision-making, including data from partners, suppliers, and analytics solutions.
- Enhance proactivity and reduce detection time through prediction and anomaly detection models.
- Leverage process automation and programmed rules execution to optimize traffic operations.

For data analysts, data officers, or developers from the Agency):

- Effectively manage data through normalization for easier analysis and data sharing.
- Discover, explore, and analyze data directly from the platform or through data exports.
- Facilitate data governance policies.
- Expand the data platform ecosystem using ingest and data consumption APIs.
- Create and automate rules and processes.
- Develop custom analytics dashboards to suit specific requirements

Kapsch TrafficCom's Traffic Intelligence solutions empower diverse user personas in agencies, optimizing traffic management and enhancing overall mobility planning and operation through tailored benefits.

Example

Shifting from reactive Smart Data Management for specific customer needs

Kapsch TrafficCom's Traffic Intelligence solutions empower diverse user personas in agencies, optimizing traffic management and enhancing overall mobility planning and operation through tailored benefits.

Buenos Aires, Argentina

Buenos Aires, Argentina, serves as a prominent urban example where Kapsch TrafficCom's solutions facilitate integrated mobility and urban traffic management. Traffic Intelligence elements, such as seamless data integration from diverse sources (traffic data, events, incidents, vehicle detections, license plate data, and public transport information), enhance the system. Key features include automated publication of street closures in Waze and early detection of alerts from the same platform. The solution incorporates robust origin-destination analysis capabilities from various data sources and thorough historical analysis, providing the city with comprehensive insights.

Vienna, Austria

In Vienna, Austria, Kapsch TrafficCom's Traffic Intelligence solution facilitates traffic optimization through automated, rule-based adjustments to traffic light plans. The system intelligently incorporates data from multiple sources, with historical analysis supporting the observation of traffic evolution. Specialized anomaly detection adds valuable context to the process.

Ireland

In Ireland, the Network Intelligence and Management System (NIMS) project spans the entire country, showcasing the effectiveness of Traffic Intelligence aspects. NIMS integrates, processes, and publishes information to drivers, enhancing safety through communication services with connected vehicles. Real-time monitoring of travel times at the operational level and analysis of behavioral patterns contribute to effective traffic management and planning.



Kapsch TrafficCom

Kapsch TrafficCom is a globally renowned provider of transportation solutions for sustainable mobility with successful projects in more than 50 countries. Innovative solutions in the application fields of tolling, tolling services, traffic management and demand management contribute to a healthy world without congestion.

With one-stop-shop solutions, the company covers the entire value chain of customers, from components to design and implementation to the operation of systems.

Kapsch TrafficCom, headquartered in Vienna, has subsidiaries and branches in more than 25 countries and is listed in the Prime Market segment of the Vienna Stock Exchange (ticker symbol: KTCG). In its 2022/23 financial year, about 4,000 employees generated revenues of EUR 553 million.

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