SPECIAL **MOBILITY** REPORT

FROM SMART CARS TO SMART CITIES

Integrating advanced mobility solutions

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PUBLISHER
bee smart city GmbH
Wiesenstrasse 35
45473 Mülheim an der Ruhr
GERMANY

CONTACT PERSON
Thomas Müller
thomas.mueller@beesmart.city
www.beesmart.city

PUBLICATION PARTNER
IAA MOBILITY

SUPPORTING PARTNERS
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EDITING & DESIGN
Thomas Müller
Joe Appleton
Kimberly Rittner
A&O Kommunikationsagentur GmbH

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FOREWORD:
THE FUTURE OF INTELLIGENT MOBILITY

by Christine von Breitenbruch & Jan Heckmann

In the grand choreography of global mobility, change is the lead dancer, leading the entire ensemble into a new era. The horizon beckons with its tantalizing prospects of innovation, sustainability, and connectivity. In this Foreword, we delve deep into the unfolding narrative, drawing on the collective wisdom that defines the next chapter in the evolution of mobility.

OVERVIEW

Mobility has always been the lifeblood of human progress, advancing civilizations and connecting diverse cultures. In the modern world, the concept of mobility is undergoing a seismic shift, influenced by groundbreaking technological advances and a heightened awareness of our environmental responsibilities. Jan Heckmann, Project Director of IAA MOBILITY, once remarked, "The essence of mobility lies in its universality." This foreword provides a comprehensive exploration of these changes, highlighting key areas such as electric vehicles, autonomous driving, data-driven experiences, and the overarching theme of sustainability.

IAA MOBILITY 2023, the global mobility platform, took place in Munich from September 5-10. It presented the future of mobility in all its aspects. This global platform served as a meeting point for visionaries, stakeholders, policy makers and enthusiasts. At the event, the world's leading automotive and mobility companies, suppliers, startups, bicycle manufacturers, micromobility and technology companies presented their sustainable, innovative ideas and solutions for climate-neutral mobility.

IAA MOBILITY 2023 aimed to highlight the interplay between different modes of transportation, companies and technologies. The aim was to showcase sustainable, intelligently networked mobility solutions, improve existing ones and make mobility safer, more comfortable and more sustainable.

Whether it's autonomous vehicles, advanced robotics, cloud and software solutions, or in-car entertainment highlights, IAA MOBILITY 2023 has shown how the future of mobility can be made more tangible and seamless.

The event also demonstrated how the increasing abundance of data will not only connect the future of mobility, but also digitize and personalize it. Concepts for smart mobility solutions in areas such as charging infrastructure, parking management, ridesharing and ridehailing, micromobility services and new approaches for efficient traffic planning towards a sustainable smart city infrastructure were presented to the public and experts.

Jan Heckmann
Head of Department IAA
German Association of the
Automotive Industry (VDA)

THE ELECTRIC AGE

The roar of the internal combustion engine is beginning to fade. In its place, the gentle hum of electric vehicles (EVs) promises a future less intrusive and more in tune with nature. But this shift isn't just about vehicles. It's a movement that encompasses advanced charging ecosystems, breakthrough battery innovations, and eco-friendly manufacturing processes. Imagine roads where silence is golden, skies that breathe easily, and an Earth where each step we take is lighter than the one before.

Christine von Breitenbuch
Director IAA MOBILITY
Messe München GmbH

As Christine von Breitenbuch, another IAA MOBILITY Project Director, put it: "The future of mobility is electric, and it's here to stay. As we champion electric vehicles as the future of sustainable mobility, it's also essential to maintain technological openness during this transition. As a proponent of this industry's evolution, I believe in leveraging both advanced and established technologies. This balanced approach ensures a smooth shift, where the continuous improvement of combustion engines complements our strides towards electrification, thereby securing a comprehensive and inclusive mobility future."

THE AUTONOMOUS ODYSSEY

Vehicle autonomy is not a new dream, but its realization is now within reach. From rudimentary cruise control to today's sophisticated driver assistance technologies, the evolution has been remarkable. Beyond technological breakthroughs, this transformation underscores the ever-evolving relationship between humans and machines. As vehicles approach full autonomy, the foundation of trust is being reshaped. Trust is now shifting from a belief in one's own driving ability to an implicit belief in the judgment and capabilities of our automated counterparts.
As Jan Heckmann once observed, "The true value of autonomy lies not in the technology, but in the trust, we place in it and the power to further democratize mobility."

CONNECTIVITY: THE NEW PULSE OF MOBILITY

Our vehicles are no longer isolated metal boxes; they're becoming interconnected nodes in a vast digital network. The advent of 5G and the Internet of Things (IoT) has accelerated this transition, turning vehicles into digital avatars that mirror our online personas.

This metamorphosis goes beyond mere entertainment. It's about weaving a digital narrative that delivers a holistic in-car experience, meticulously crafted to resonate with individual preferces. Christine von Breitenbuch emphasized, "Connectivity is the heartbeat of modern mobility, pulsing with endless possibilities."

REDEFINING URBAN MOBILITY

Urban centers, the vibrant nuclei of human society, are constantly evolving. At IAA MOBILITY, our understanding of the nuances of urban mobility is profound, thanks to the visionary insights of various partners and exhibiting companies. They show that innovations can make an enormous contribution to optimizing traffic in urban centers – more sustainable too! – and that the linking of various modes of transport will continue to progress.

One more reason why the IAA MOBILITY not only has car manufacturers and suppliers on board, but also cycling, public transport and micromobility. We champion dialogue and connectivity, underscoring our unwavering commitment to pioneering solutions that are not only groundbreaking, but also inclusive and ecologically sound.

DATA-DRIVEN JOURNEYS

Today's vehicles are more than just transportation tools; they are data repositories on wheels. The next generation of infotainment systems, powered by AI and sophisticated data analytics, promises tailored experiences.

These systems will have an uncanny ability to understand users' nuances, habits, and even fleeting emotions, creating journeys as unique as the people who take them. As Christine von Breitenbuch insightfully noted, "In the age of data, every journey tells a story."

CENTRALIZED COMPUTING IN VEHICLES

The technological marvels on wheels are going through a consolidation phase. There's a concerted effort to streamline and centralize systems, replace a plethora of individual ECUs with zonal ones, and redefine the role of the CPU. The advent of storage solutions such as SSDs in vehicles is a game changer, setting the stage for automotive innovations that were once the stuff of science fiction. Jan Heckmann observed, "The car of the future is not just a vehicle; it's a sophisticated computing platform as well."

VEHICLE-TO-EVERYTHING (V2X) COMMUNICATION

The V2X communication paradigm is on the cusp of radically changing the way vehicles perceive and interact with their environment. While today's vehicles can connect to intelligent infrastructure, the rise of ADAS-equipped and autonomous vehicles will lead to an increase in vehicle-to-vehicle dialog. This promises safer, more synchronized driving that will transform our entire vehicle experience. "V2X is the language of the future, allowing vehicles to seamlessly communicate with the world around them," said Christine von Breitenbuch.

IN-VEHICLE EXPERIENCES AND SENSOR TECHNOLOGY

Digitalization is redefining vehicle interactions. State-of-the-art in-vehicle infotainment (IVI) systems immerse passengers in a multi-sensory experience that combines entertainment with advanced functionality. In addition, a surge in the use of vehicle sensors, both internal and external, is raising safety standards and enriching the driving experience. These sensors, coupled with AI-driven algorithms, can actively monitor drivers and provide real-time feedback and alerts, fostering a safer driving environment. Jan Heckmann noted, "Tomorrow's vehicles will be sensory marvels, attuned to every nuance of the driving experience."

SUSTAINABILITY: THE HEARTBEAT OF MODERN MOBILITY

The call for sustainability is reverberating throughout the automotive landscape. It's no longer just a buzzword; it's an ethos that guides every facet of vehicle design, manufacturing and use. The automotive industry's commitment to a greener future is unwavering, with concerted efforts to reduce carbon footprints, promote renewable energy, and foster eco-friendly innovation.

As Christine von Breitenbuch aptly put it,

"SUSTAINABILITY IS NOT JUST A GOAL; IT'S THE SOUL OF MODERN MOBILITY."

CONCLUSIONS

The future of mobility is a tantalizing tapestry of innovation, sustainability, and connectivity. As we stand on the cusp of this new era. A deep understanding of the intricate nuances of mobility, coupled with unwavering commitment to pioneering sustainable and inclusive solutions, ensures that the future is not only promising, but also equitable and environmentally sound. As we embark on this exciting journey, we do so with the knowledge that the essence of mobility lies in its universality, and the future beckons with its endless possibilities.

Get ready for IAA MOBILITY 2025! In the meantime, stay up-to-date with weekly mobility industry news at **www.iaa-mobility.com**

www.beesmart.city

INTRODUCTION

by Joe Appleton & Thomas Müller

In this report, we embark on a journey through the evolving landscape of urban mobility, a critical concern at the heart of our cities' futures. Urban mobility isn't just about the mechanics of moving from Point A to B; it's about reshaping our collective life's fabric. We delve into digital twins and the role of data in sculpting smarter, more sustainable cities, showcasing how technology is not just an enabler but a catalyst for transformation.

Through case studies and expert insights, we explore innovative solutions and their impact on our streets and the air we breathe. From the bustling streets of Helsingborg to the innovative micromobility hubs of Poznan, each narrative offers a glimpse into the potential of smart mobility to enhance urban life. We critically examine the promises of high-tech solutions against the backdrop of real-world applications, questioning the balance between innovation and practicality.

This report is a call to action for cities, businesses, and citizens to collaborate towards a more connected, efficient, and sustainable urban environment.

It underscores the importance of data-driven decision-making and the integration of various transport modes, from electric scooters to public transit, within a cohesive urban mobility ecosystem.

As we look to the future, it's clear that the path to smarter, more livable cities requires not just technological innovation but a collective will to embrace change. This journey through the landscapes of urban mobility invites you to envision a future where our movements are not just efficient but enrich the quality of urban life for all.

Let us embark on this journey together, with eyes wide open to the challenges and hearts buoyed by the promise of a smarter, more connected world.

In the spirit of gratitude, we want to express our sincere thanks to our more than 20 publication partners for their valuable contributions. Their support has been instrumental in making this report a reality.

Joe Appleton
Editorial Director
bee smart city GmbH

Thomas Müller
Managing Partner
bee smart city GmbH

Annika Lundkvist
Founder
PedestrianSpace.org

"THE PROBLEM IS NOT TECHNOLOGY. THE PROBLEM IS YOU. YOU LACK THE WILL TO CHANGE."

Alien to human in "The Day the Earth Stood Still"

BEYOND CARS: CULTIVATING A NEW MOBILITY CULTURE

I began writing this piece in early 2024 while on a visit to San Diego County, the region where I was raised. It had been almost three decades since I had returned. I was stirred by remembering how gorgeous the region is and the air rich with that open West Coast spirit and unparalleled views of the Pacific Ocean as you ride along the coast.

I thrilled in the experience of enjoying that precise coastal view while on the Coaster Commuter Rail, a train service running North to South in San Diego and serving 8 stations. The Coaster debuted the year I graduated from high school and shortly after left the state. It was not until decades later, this year, that I had the opportunity to experience a commuter option in the region that did not involve the automobile.

ALTHOUGH, THAT'S ONLY PARTLY TRUE.
To tell the full story, to reach the rail in a reasonable amount of time (I was traveling with my two young children, else might have felt more experimental to commit the time and navigation it would have taken to connect to the rail by bus), I ordered a ride-hail service. I felt a bit guilty about this, not least because the affordability of the afternoon and rail experience was then completely chucked out the window with the rather pricey cost of the ride-hail.

My guilt was somewhat eroded when, upon return, we deboarded the train, and, as we walked to the parking lot, a woman walking next to us began to freely share that her car was in the shop, hence why she was using the train but that she still needed to order a ride-hail service to make it the last leg home.

I quietly noted to myself that this single mother (yes, she volunteered that information too) was not jumping from train to bus for the last leg home but rather ordering a ride-hail service for which she even complained to us, her new partners on the pavement trail, as being expensive. Indeed, it was, but the expedience trumped the hassle of dealing with the bus.

Sometimes the challenge of car dependence feels insurmountable when you are in areas where it's the overwhelmingly dominant mode. The space and infrastructure are there in many cases and investment to public transit has clearly been ongoing, but as with many North American (and other world) regions, still so much more to go to make it a viable option for many people to depend on.

At some point, I also thoughtfully looked around the rather well-to-do neighborhood where we were staying in North San Diego County and observed well-maintained sidewalks, good bus shelters and bike paths. Yet, when we opted to move around the neighborhood by foot, we were always the only pedestrians. In this specific neighborhood context (mirrored in other neighborhoods across the region and nation), it was not necessarily the infrastructure and space that was lacking or subpar for an optimal local walking experience, but more specifically a **culture of walking**.

This account is not meant to dismiss the deeply unfortunate reality that in many neighborhoods and communities across the USA (where my tale here begins) and the world, walking is not spatially or infrastructurally convenient nor safe. Decades of auto-centric planning have rendered pedestrianism as a mode as not even an afterthought but simply absent.

My focus on walkability via my media advocacy and research is largely centered on the culture and psychology of mobility choices and mobility decisions. In the framework of my approach, mobility choices are what we encounter as available and generally convenient in our daily life. Do you have safe and accessible bike parking next to your building? A metro, bus or tram within a few blocks from your home that takes you where you need to go? Well maintained and continuous footpaths between locations you need to go? A basement garage in your apartment building where you can readily access your company car? Mobility decisions are then what we choose to move with based on what is available and the whole matrix of influence that leads to our final decision.

Our societal attachment to cars needs to be heavily probed and there is work to do to simultaneously destigmatize walking and public transit in such places while also advocating for further investment in space and infrastructure that facilitates people gravitating towards them as increasingly convenient or attractive options. It is not only about investment and infrastructure but also culture and psychology and understanding transit equity as a quality of life issue.

Over the past year, as part of my dissertation research, I hosted a series of Warsaw-based Urban Mobility Workshops. I also called these 'Mobility Thought Labs' as they tended to be cerebral experiences where participants were able to unpack their feelings and experiences regarding different forms of mobility, reflect on issues of movement and neighborhood life during the pandemic and share how they would reshape their mobility habits if they could (or wanted to). These experiences attracted many people who are very conscious of their own mobility decisions and the broader impact. This made for really great organic focus group-like experiences with extremely sustainable mobility-minded inhabitants.

However some of the workshops, for example with different elderly groups, were with participants who didn't think much about 'sustainable mobility' and maybe even despite relying on walking as their primary mobility, had never heard the term walkability. These were, for me, some of the juiciest experiences as they provided an opportunity to get out of the silo.

I look forward to getting in front of and interacting with more groups of people who have never heard of the term walkability before. Talking with diverse communities about the benefits public transit can bring. Interacting with planners and public transit authorities to advocate for bus shelters, safety at stations, quality sidewalks & more. Communicating with skeptics that the 15-minute city is not about restricting freedom but in fact quite the opposite - a liberation to choose to move by foot and communicating how important it is to center issues of equity when we discuss and advocate for the concept.

While I was recently back in the region of my upbringing, I was dipped immediately back into a culture of near-total car dominance. As I finish writing this piece, I am back in my current home environment in Warsaw, Poland, where multiple public transit options exist within a few blocks yet where many inhabitants also choose to drive, as noted on frequently congested roads. I reflect on my recent return to the USA, where I was dipped immediately back into a region and culture of near-total car dominance. Getting out of my silo necessitates bringing my voice to this culture - understanding that for many, a choice to switch modes does not exist or is wildly inconvenient.

At some point in recent years, it became clear to me that not only did I enjoy walking as a primary mode to move around my community but that it also was a core value. I knew it was a dealbreaker for me to return to a lifestyle where I would have to tuck my kids in the backseat of a car for all daily movement. I finally understood it as a value to raise them with the opportunity and ability to walk and use public transit as a primary mode of mobility.

To move 'beyond cars', there is ongoing need for truly inter and transdisciplinary action and collaboration. I believe there is also a vital need to acknowledge the cultural and psychological dimensions of car dependence and how societies permit or restrict our understanding of mobility as a value. In my continued media advocacy at Pedestrian Space and my research, this is the motivation it comes back to - conveying this value and helping with societal shifts that enable people to live their lives not captive to cars.

Learn more about walkability and sustainable urbanism at:

https://pedestrianspace.org/

DIGITAL TWINS: PIONEERING SMART MOBILITY IN URBAN LANDSCAPES

Cyclomedia creates a digital twin of your city: image and laser scan data of the public environment, enriched with object information generated using AI. But how can digital geodata be used to optimize mobility and traffic in cities in terms of safety, sustainability and future viability?

PwC's Smart City Index 2023 shows that mobility in Germany's cities is becoming smarter. But there is still a lot of catching up to do: Optimizing public transport, expanding cycle paths, ensuring traffic safety and the fair distribution of public spaces are key factors in adapting the mobility offer to the needs of citizens.

FAIR DISTRIBUTION OF PUBLIC AREAS

Smart cities focus on their citizens. Their needs should be met and the city should be made more livable and attractive. The fair distribution of public space makes a significant contribution to this, which is becoming even more relevant in the new competition between motorized traffic, stationary traffic, bicycles, electromobility, public transport and pedestrians. The first step on the way to smart mobility is therefore to take stock of the current use of public spaces. Cyclomedia offers the possibility of using AI to take an inventory of public areas for so-called area mapping. Cities automatically receive an overview of the surface classes and types of use of all public areas in the city. This not only answers the question of how public spaces are currently used, but also what the ratio between green and gray in the city is or how high the degree of sealing is. Based on the area mapping, you can redistribute the areas for the benefit of citizens and the environment.

KEEP AN EYE ON THE CONDITION

The growing number of road users is affecting the condition of roads, endangering the safety of cyclists, people in wheelchairs or people with walking difficulties. Based on high-resolution image and laser scanning data, Cyclomedia offers visual road condition analysis to cities, helping them keep an eye on the condition of the urban road network as well as cycle paths and sidewalks. With this information cities can also digitally plan road maintenance measures and repairs and coordinate them with other parties involved.

TRAFFIC SIGNS AND LIGHTING PROTECT ALL ROAD USERS BY PROVIDING CLARITY

An efficiently used traffic sign concept ensures clarity on the roads, protects all road users equally from accidents and steers the traffic according to demands. Traffic sign registers also provide the basis for the use of innovative mobility technologies such as autonomous driving and are therefore the prerequisite for the establishment of smart mobility concepts. Lighting in urban areas also makes a significant contribution to the safety of cyclists and pedestrians in particular by ideally illuminating confusing intersections with busy streets or dark corners.

The position of light poles is additionally an important asset to install sensors or actors in a Smart City. With the help of AI, Cyclomedia extracts cadastral records of all traffic-relevant objects and area mapping from the image and laser scan data and make them available to the responsible experts in the specialist offices in city administrations. The integration of the data enables analysis and further processing in common GIS and analysis software.

THE DIGITAL TWIN IS DRIVING GERMAN CITIES FORWARD

Smart mobility concepts focus on the citizen and make a city attractive and worth living in: In Leipzig, the cycle paths were expanded with the help of digital geodata, in Paderborn a comprehensive traffic sign register was created and in Frankfurt the tactile guide strips were recorded to ensure accessibility in the city.

Cyclomedia is proud to contribute and support cities in their efforts to become more inclusive, safe and sustainable.

Julia Koch
Marketing Manager DACH
Cyclomedia Deutschland GmbH

Thomas Homrighausen
Managing Director Germany
Cyclomedia Deutschland GmbH

Discover Cyclomedia's digital twin for smart mobility planning and other smart city use cases at:

www.cyclomedia.com

DATA-DRIVEN JOURNEYS: ENHANCING PUBLIC TRANSPORTATION SYSTEMS

As urbanization continues to grow at an unprecedented pace, the spotlight increasingly focuses on the pivotal role of mobility in urban planning. Mobility not only significantly impacts the environment but also plays a vital role in shaping sustainable and livable cities. Demand-oriented mobility is key, as it tackles various pressing issues such as alleviating traffic congestion, improving air quality, boosting energy efficiency, and enhancing accessibility - all while contributing to mitigating climate change. Recognizing the interconnectedness of crafting comprehensive mobility concepts and reducing CO_2 emissions, the European Union implemented various strategies. Among these initiatives is the European Green Deal which aims to steer the EU towards climate neutrality by 2050.

Central to this plan is addressing air pollution and promoting public transportation. Understanding citizens' mobility patterns is crucial to achieving the objectives outlined in the European Green Deal and fostering data-driven and demand-oriented mobility.

By identifying the user's needs and preferences, public transport providers can tailor their services effectively and thereby transforming the mobility landscape to create the necessary conditions for low-emission solutions.

By leveraging state-of-the-art technologies, data-driven approaches can provide an indispensable foundation for making informed decisions to enhance public transportation networks. These solutions offer insights into the actual usage of transportation modes, replacing mere estimations and enabling precise infrastructure improvements with the help of identified levers.

Modal split and carbon footprint analytics with the PwC Mobility Platform

For example, analysing metro users' transfer behaviours aids in capacity planning, while monitoring parking space utilization identifies the need for additional facilities. Therefore, data-driven optimization tailors a city's mobility offerings to its citizens' needs, augmenting not only the attractiveness of public transportation but with increased users also reducing a city's environmental footprint.

BUT WHAT DOES A TECHNOLOGY-DRIVEN SOLUTION ENTAIL?

At its core lies a comprehensive database sourced from various sensors and technologies. Intelligent sensors like counting sensors or cameras, along with smartphone sensors tracking users' locations, provide valuable movement data and information on paths, crowd densities, and preferred modes of transportation, all while adhering to GDPR standards. Especially existing apps from transportation providers bring the opportunity to integrate a small software module (SDK) to collect data anonymously and with minimal setup efforts.

Subsequently, the various data sources connect to an intelligent mobility platform that analyses and visualises the collected data. The analyses offer insights into utilization rates, user distributions, transfer behaviours, and movement patterns. Real-time identification of overcrowded stations, popular routes, developments in the modal split over time, and predictive analysis of future congestion hotspots are just a few examples of the invaluable analyses.

PwC has successfully implemented its mobility platform across multiple regions, providing actionable insights derived from the data. Cities and mobility service providers such as the "Märkischer Kreis" in North Rhine-Westphalia, Germany, the "Märkische Verkehrsgesellschaft" (MVG), the "Aachener Straßenbahn und Energieversorgungs-AG" (ASEAG), as well as the railway infrastructure company "Bahnen der Stadt Monheim" have already started experiencing the advantages of the PwC software solution. Other institutions, like the Münchner Verkehrs- und Tarifverbund" (MVV), are leveraging targeted applications for focus analyses in specific areas of interest.

With customizable solutions and benefit-oriented features, mobility data platforms are transforming how cities leverage data to enhance their transportation offerings.

Increasing the utilization of public transportation is an important piece of the puzzle to mitigate climate challenges while simultaneously improving citizens' quality of life with attractive mobility concepts.

Louisa Uhlemann
Senior Associate
PwC AI and Mobile Solutions

Learn more about PWC's mobility data platform:

www.pwc.de/de/branchen-und-markte/oeffentlicher-sektor/ai-and-mobile-solutions.html

Thomas Van Oppens
Deputy Mayor for Digitalization
City of Leuven

LEUVEN'S LEAP: DATA INTELLIGENCE TRANSFORMING URBAN PLANNING

Policymaking is about making tough choices that don't always benefit everyone equally. Our job as policymakers is to find the solutions that serve the greater good. Thankfully, we have tools to help us. For decades, models have helped predict the outcomes of policies on taxes, unemployment, and climate change. But this data was rarely available at the local level.

Mayors and deputies often had to make decisions blindly. What would the impact of a road closure be on traffic? Could a cycling path truly improve air quality? These were matters of guesswork, not science. The expense of gathering and analyzing data was simply too high for many smaller cities and towns.

Without data, local debates became deadlocked. Everyone wants safer streets, thriving businesses, and cleaner air, but endless disagreements arose over how to achieve those goals. Was an extra lane a solution to traffic, or would it worsen the problem? Opinions, not facts, drove the conversation.

But times are changing. The cost of sensors and computing power is plummeting. Advances in AI and data management put sophisticated analysis within reach of everyone. Our cities are becoming living laboratories. Take Leuven's mobility issue. Concerned citizens started, "we count"', a project using simple technology to track traffic outside their homes. The project grew, revealing the true extent of the problem. Residents demanded action.

Our city responded by subsidizing sensors to cover more streets. Many governments fear such transparency, knowing it means the end of dismissing citizens' concerns as insignificant. But it also empowers specialists to model the precise impact of traffic measures.

What will happen when roads close, become one-way, or prioritize cyclists? We'll no longer guess – we'll know. Data-driven decisions improve our city for everyone, and they enable productive discussions based on science, not opinions. It allowed my city to make a whole package of changes in mobility while being able to explain citizens the reasoning behind and the impact of each choice.

It's time to embrace this revolution. We can make local government more effective. We no longer need to fear push-back against necessary change. To all local officials: the era of informed decision-making is here. This will allow a focus-shift towards ends instead of means and thus improving the choices we make.

→ **www.leuven.be**

ACCESS TO INFORMATION: THE KEY TO SUSTAINABLE URBAN MOBILITY

When thinking about smart mobility, sexy topics like electrification, IoT, AI and autonomous driving come to mind. And although these certainly effect mobility, they do not shift the modal split as much as access to information does. So what can transport authorities do to leverage access to align with sustainability goals? First of all sustainability in this sense is not just the ecological improvement, but at the same time the business case of mobility with regard to public funds and public space.

Authorities have either domain specific roles, such as mobility or public space access and usage policies. Under the EU regulation on data, these roles are extended, which requires authorities to get up to speed on data, quickly and adequately. One of the roles is that authorities hold much and valuable data on its (data) subjects.

Besides basic registries, with personal facts (name, place date of birth, address, etc.) they have financial information which can be used to provide discounts to citizens that require such to make use of (public) transport facilities.

 # 3 REASONS FOR CITIES TO WAKE UP AND SMELL THE COFFEE:

1. Open up the ticketing solutions to have access to data, to be compliant with GDPR and to reduce the cost by avoiding vendor lock-ins. Technology has become a synonym for dependence. An attractive use case to start buffering information that allows the processing of identification and authorisation for both payment and entitlement activities. These black-boxes need to be made translucent to help the relevant stakeholders to be able to consent to the use, following the Data Governance Act in relation to the GDPR.

2. Align the networks for an improved experience using a myriad of services from public transport to shared mobility, and use the public space fairly and efficiently. With access to mobility information on both the execution and consumption, public authorities can align the public service obligations given in concession to transport operators. By being in touch with the constant change, this can be done on a more regular basis than once every 5 or 10 years. Even to the level of events that transport services can be aligned to meet the demand of an influx of passengers.

3. Open up personal data, the facts (age, status (student), income level) as well as the financial information to accommodate those citizens that lack the financial resources to use public services. By reusing personal facts, but also financial information to the specific data processing activities in which they are required, they can assist in adding trust in the interactions. Opening up to include those citizens that would otherwise not be travelling by public but by private means.

In all of the roles they play, authorities both have a duty to make sure that the digital safety is met in publicly offered services, similar to the physical safety. This means that authorities must be able to validate just use of personal data, as contribute to the reuse thereof in the given circumstances. The information that feeds back to operators, authorities and citizens, helps to shift the modal split to align with the ecological, economical and social goals, whether societal or individual.

Ferdinand Burgersdjik
Founder
FRCB B.V.

www.frcb.nl

MUNICIPAL DATA UTILITIES: ENABLING SECURE DATA EXCHANGE ON AN INTRA- AND INTER-MUNICIPAL LEVEL

Predicting passenger numbers in public transport, the utilisation of car parks, and electric vehicle charging stations. Using energy data to reduce emissions in neighbourhoods or tackling even more complex challenges such as sustainability and transformation issues, for instance, in mobility and transport or climate protection. These keywords address the efficient provision of public services by municipalities and municipal companies in the digital age.

For this purpose, secure data exchange and connected solutions are required; especially the secure sharing of (partially) restricted and high-value data (HVD). The problem: So far, there is no technical and legally secure solution at the municipal level.

To date, municipal data management has focused primarily on publishing open data or geographical data, partly due to uncertainties surrounding this complex field. (Partially) restricted and HVD have not played a role yet. They remain stored in silos within the respective municipal organisational units – untapped potential!

To generate evidence-based solutions and decisions in the digital provision of public services, as many (partially) restricted and HVD as possible from as many stakeholders as possible are needed. And they must be accessible. Not least because municipalities are legally required to publish HVD from 9 June this year. Data silos must, therefore, be dismantled. Added value is created only through the joint use of data.

This is where Municipal Data Utilities (Kommunale Datenwerke) come into play – in short: MDU, a solution developed by the Data Competence Centre for Cities and Regions (DKSR) GmbH in collaboration with Fraunhofer FOKUS, PMG Parking in Mainz GmbH, Pinsent Masons LLP, and Mainzer Stadtwerke AG.

A potential structural implementation of a mobility station of the future with various features, such as solar systems for power generation, WiFi hotspot, seating and roofing. In the future, different modes of transport (such as public transport, cars, bicycles, scooters) will come together in these stations in order to make it easier to switch from one mode of transport to the other.

Nora Abu-Oun
Head of Communication
DKSR GmbH

Discover the Municipal Data Utilities project and the Open Urban Data Platform of DKSR at:
https://www.dksr.city

An MDU is a protected virtual space where intra- and inter-municipal actors can exchange relevant data in a standardised and thus legally secure manner. MDU is based on the Open Urban Data Platform (OUP) "UrbanPulse", developed by DKSR and the open-source data management system Piveau, developed by Fraunhofer FOKUS. The integration of both products enables the discovery, secure sharing, processing, analysis, and exchange of data almost in real time. Moreover, the OUP is cloud-independent and user-friendly, which should strengthen acceptance and facilitate entry into the field of urban data.

This data space is being developed through a use case in Mainz in the mobility sector. Here, for example, HV mobility data is being incorporated – including passenger numbers of Mainzer Stadtwerke and the utilisation of car parks by the operator PMG. The goal: With the help of MDU, patterns should be identified and forecasts about future use of public transport and motorised private transport should be made possible. Thus, for example, bus routes, frequencies, and (composite) ticket offers can be optimised and, if necessary, additional vehicles can be purchased. This could reduce motorised private transport. Citizens could decide based on car park utilisation whether to drive their private cars into the city centre (or rather not) or see where the next available electric vehicle charging station is and head there. All for the benefit of people and the environment!

As already evident from the Mainz use case – and can be supplemented through further use cases – MDUs can help achieve the United Nations Sustainable Development Goals. In the case outlined for Mainz, for example, SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities) would be addressed. At the same time, MDUs can make cities more resilient, enabling them to respond to disasters and emerge stronger from them. Municipalities can also provide data through MDUs, for example, for the Mobility Library – a central platform for open mobility data provided by the Federal Ministry of Digital and Transport.

The data integrated, analysed, and provided through MDUs allows for real-time traffic information and other use cases, such as for smart waste management, urban planning with geographical information systems, development of a citizen app, a digital twin, or the control of energy flows in urban districts. Especially given the mandatory municipal heat planning, this is a broad field with enormous potentials that need to be tapped.

Complex transformation challenges can only be mastered together. Therefore, MDU is being developed with and for municipalities. Accordingly, the software is open source, meaning it can be easily replicated and further developed, and the methodology behind it can be published.

The project "(Inter-)Municipal Data Utilities: Conceptualisation, Evaluation, and Implementation of a Municipal Data Sharing Platform" is funded by mFUND and the Federal Ministry of Digital and Transport. It started at the beginning of 2023 and runs until the end of August this year. Although it is not yet completed, the project is already attracting attention. There are already inquiries for an MDU 2.0.

The Municipal Data Utilities (Kommunale Datenwerke) project is led by DKSR GmbH and Fraunhofer FOKUS.

DKSR Data Competence for Cities and Regions

Fraunhofer FOKUS

The project is funded by the Federal Ministry for Digital and Transport and supported by mFund.

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THE URBAN METAVERSE: REVOLUTIONIZING MOBILITY WITH VIRTUAL INNOVATION

VIRTUAL CITY TOURS & REAL-TIME INTERACTIONS

Let's shake things up and dive headfirst into how The Urban Metaverse isn't just revolutionizing Smart Mobility in Smart Cities – it's making it ridiculously cool and practical. Picture this: You're zooming through a virtual tour of Montgomery, Alabama, not just as a bystander, but as a part of the city's pulse. In 2025, the city of Montgomery is getting a mega-boost with BizzTech's next-gen metaverse solution, transforming the 60th anniversary of the Selma to Montgomery Civil Rights March into a full-blown, immersive experience.

Their browser-based, photorealistic platform doesn't just transport the user to the streets of the city, but makes the entire experience highly interactive and globally social. This isn't your typical "click-through" virtual tour; it's an adrenaline rush with AI-powered guides and real-time chitchats with city experts, making you feel like you're really there. This is smart mobility taken to the next level, offering a sneak peek into transport options and city vibes without stepping outside.

DIGITAL TWINS FOR URBAN PLANNING & SUSTAINABILITY

And let's talk about the showstopper – Digital Twin Technology. It's like having a mini-city at your fingertips, allowing you to supercharge urban planning and mobility. Inspired by BMW's leap into the metaverse for factory operations, this tech lets us clone urban jungles. Imagine tweaking traffic systems or planting new public transport routes in a photorealistic digital twin city before making a single real-world change. It's about making smarter moves in urban mobility, ensuring every new initiative hits the ground running, perfectly synced with the city's heartbeat.

In the heart of this transformation, sustainability takes the front seat, weaving environmental consciousness into the fabric of Smart Cities. The Urban Metaverse leverages this digital twin technology to not only optimize urban mobility, but also to spotlight green zones and eco-friendly initiatives. By integrating live environmental data, users can visualize the impact of their mobility choices on the city's air quality and green spaces in real time. This approach empowers individuals to make informed decisions that contribute to the city's climate-neutral goals. Moreover, it opens up avenues for participatory urban development, where citizens can suggest and visualize the effects of their eco-suggestions in the metaverse before implementation. Imagine a scenario where you could propose a new bike lane through the digital twin of Montgomery, see its potential effects on traffic and pollution, and have it reviewed by city planners and the community alike. This level of interaction and engagement is revolutionary, turning urban mobility into a collaborative, inclusive, and environmentally responsible endeavor.

VISUALIZING LIVE IOT DATA WITH URBAN METAVERSE

Now, if that wasn't cool enough, to take it one step further – visualizing live data in 3D. It's not just about making smart mobility efficient; it's about turning it into a visual feast. For example, Urban Metaverse platform's like BizzTech take the boring out of traffic data, transforming it into a 3D extravaganza of flowing traffic, blinking congestion points, and pulsating public transit rhythms. This isn't just another data dashboard; it's living. It's the future of urban exploration, where every stakeholder, planner, and city dweller gets to dive into a breathing virtual city. Real-time updates? Check. Planning your night out avoiding traffic like a pro? Double check.

City traffic simulation runs on the BizzTech platform in a browser.

Learn more at: **bizztech.io**

Discover the Urban Metaverse for Smart Cities: Conference in Tenerife, **October 17-18, 2024**. Register now at **UrbanMetaverseSummit.com**!

HELSINGBORG'S HORIZON: A TESTBED FOR SUSTAINABLE MOBILITY SOLUTIONS

In recent years the Swedish City of Helsingborg has quickly established itself as a hub for different international test beds. Recently dubbed Sweden's best logistics location, mobility and sustainability are some of the areas being explored and tested.

Lisa Olsson, Director of Innovation and Transformation in the City of Helsingborg says: "The city is active and contributes to innovation collaboration and growth. One approach we take is serving as a testing ground for innovative welfare solutions. To ensure that Helsingborg is a place for everyone and where the quality of life is high, the city needs to collaborate with civil society and the business community to find new ways.

STRATEGIC PARTNERSHIPS FUEL INNOVATION

The city recently partnered with Lund University and the Spanish innovation company Malena Engineering for a series of tests involving micro mobility as part of the city's transport system. The tests involve a partially 3D printed vehicle as part of a disruptive transport solution for people and goods. The vehicle is driven with a joystick and without pedals. In the future it can be fitted for autonomous drive when legislation permits.

HELSINGBORG SERVES AS A TESTING GROUND FOR VARIOUS MOBILITY SOLUTIONS

One of the mobility tests in Helsingborg involves people with reduced mobility and some in need of a wheelchair. The vehicle is approved for use by individuals with total or reduced mobility. This is supported by lateral and frontal entry access with support for flexible seating configurations. A couple of other tests aim to support how mobility systems can help provide solutions to meet the needs the needs of the city's administrations and actors from civil society, including citizens and associations. In addition to the previously mentioned tests, the city is also engaged in ongoing mobility trials encompassing bicycles, enviromental sensors, smart street lighting and robotics.

WHY MUNICIPAL INNOVATION?

Helsingborg's focus on innovation and cooperation stems from the challenge of a growing population amidst stagnant tax revenue. A growing part of the population is ageing, and another group are young people and children.

The 3D-printed vehicle can be loaded from both the front and back. Here, Christian Orsing (right), Mayor of the City of Helsingborg, test drives e-Miles.

Still, the municipality must be able to continue to offer quality service and welfare solutions to its citizens.

To meet the demands on public service for the future the city has ramped up its innovation work. By offering the city as a test bed for cooperation with academia, businesses and associations, future welfare solutions are created and shared with other cities.

Lisa Olsson, Director of Innovation and Transformation concludes: "We have been working in a structured way with innovation for a number of years now and it is starting to produce real results in terms of welfare solutions. These efforts demonstrate the widespread integration of innovative approaches within our organization, yielding tangible results in welfare solutions".

Åsa Bjering, Programme Manager Climate and Green Transition, City of Helsingborg

Discover the making of a smarter city in Helsingborg: **https://helsingborg.se/makingofasmartercity/**

TECH ILLUSIONS: RETHINKING HIGH-TECH SOLUTIONS IN URBAN MOBILITY

In December 2016, Elon Musk, frustrated with traffic, tweeted his plan to dig a tunnel: "Traffic is driving me nuts. Am going to build a tunnel boring machine and just start digging." Musk vowed to revolutionize city travel with tunnels moving autonomous cars. His fans were thrilled. What could be more exciting than what they consider as a renowned inventor tackling a major urban problem? The tech billionaire and his "Boring Company" promised a system that will be convenient and easily accessible, with numerous entry and exit points integrated into the urban landscape.

Sounds familiar? To many it reminded a metro system, but an inferior one: investing a lot in tunnels that move very few people in Tesla cars. The first project, the "Loop" in Vegas, promised a capacity only 10% of a traditional metro, which is a century old technology. Nonetheless, the government insisted in investing in this project.

Six years and $53 million later, we now have a proven built version of Musk's "genius": a system that moves very little people, and requires drivers for each car that can carry only a couple of people. And the promise for self driving cars? The Boring Company no longer mentions it on their website. It's laughable, because new metro systems - from Denmark to India - are driverless.

Less than a year after his tunnel opened, Musk tweeted, "Defeating traffic is the ultimate boss battle. Even the most powerful humans in the world cannot defeat traffic." His acknowledgment of failure hasn't stopped him from promoting his tunnel concept to cities. Cities are buying in, lured by the promise of a quick fix from a charismatic, wealthy man.

The Loop saga is another costly misstep in urban mobility. While the public money spent is irretrievable, we can still glean lessons from it. First, it is an important lesson for tech enthusiasts who are sure they can solve the world's problems with the right line of code. It's just not that simple. Secondly, it's another reminder that we actually already know how to transport large numbers of people in cities. The necessary technology has existed for decades. Constructing adequate sidewalks, secure bike lanes, and effective transit systems isn't rocket science.

However, making these modes of transport thrive requires more than tech. We need to halt the creation of single-purpose, low-density neighborhoods. We need to inject in existing cities more greenery, build more apartments, and replace car infrastructure with other urban utilities. Sustainable mobility thrives on density and a mix of uses, in places where people feel safe and comfortable to move with their feet.

For Musk it seems like the 'ultimate boss battle', but for many urbanists it's an achievable goal, especially if the tech-focused minds will join them. And by this, I call to all the bright minds in the world of technology and mobility to join forces. We truly need every bit of human creativity and teamwork to make our cities more sustainable.

Lior Steinberg
Co-Founder of Humankind

Learn more at:
www.humankind.city

THE LAST MILE CHALLENGE: PAVING THE WAY FOR GREENER DELIVERIES

Last-mile delivery is the final step of the delivery process, from the product leaving its place of distribution to the point when it is handed over to the consumer. What does it have to do with mobility and city life? Well, apart from being the most expensive and time-consuming part of the supply chain, last-mile delivery also creates a number of challenges for urban areas. Air pollution, CO_2 emissions and traffic congestion are the ones where the impact is most obvious. The last mile accounts for approximately 30% of the CO_2 emissions of the whole logistics sector. These challenges become even more acute with continuous growth in the online shopping segment.

Oleksandr Plyska,
Vice President,
Sigma Software

ANY PROGRESS SO FAR?

Sustainability requirements push logistics companies worldwide to optimize their last-mile delivery processes and use green technologies to reduce the environmental impact. For example, according to the recent European Commission report on e-commerce, more logistics companies in Germany are trying to convert their fleet to mostly electric vehicles for final-mile delivery and use cargo bicycles wherever possible.

Electrification, robots, and other future technologies are important of course, but at the same time it is efficient capacity utilization and route optimization that still play the major role in making last-mile delivery more sustainable. The truck's volumetric capacity is often underutilized in residential deliveries. Big logistics companies tend to aggregate demand and combine packages from multiple sources to increase the delivery density and then place the packages in the optimized delivery routes to reduce miles in transit.

Demand aggregation and route optimization work really well for logistics players with substantial volumes but are quite challenging to handle for smaller local delivery service providers who have lower volumes and, thus, less room for aggregation.

WHAT MORE CAN BE DONE?

One of our Clients in Germany is an innovative last-mile delivery start-up who was concerned with the environmental impact of the last-mile delivery with smaller providers. Their idea was in finding a way for local service providers to benefit from aggregation and route optimization even on the small scale.

So, we helped them create a collaborative platform that connects retailers, drivers, and fleet owners into one network to provide shared delivery and route optimization capabilities. To date, the solution has already been successfully integrated with 80+ retailers across Germany, has already enabled not only timely and cost-efficient but also more sustainable last-mile delivery for over 2 million orders.

THINGS TO THINK ABOUT

Collaboration & sharing have been the new black for a while already. But somehow, while talking about mobility, we focus on individual transportation and limit its application to car-sharing, ridesharing, etc. But at the end of the day, it's not only individuals who need mobility. Commodities and goods need it as well. Collaborative platforms unlock great potential for putting the capacities of smaller operators and service providers into one significant force that can definitely contribute to making our urban areas a better place to be.

https://sigma.software

Jonas Damidavičius
Head of Sustainable Mobility, JUDU
City of Vilnius

CIRCLING SUSTAINABILITY: VILNIUS'S TRAFFIC LOOPS AND POLLUTION CONTROL

THE CHALLENGE: PRESERVING, PROTECTING AND PROMOTING CULTURAL HERITAGE

Despite the significant cultural heritage value of Vilnius's Old Town and its archaeological area, inscribed as a UNESCO World Heritage site in 1994, the neighbourhood had long been suffering from heavy car traffic causing air and noise pollution and affecting road safety.

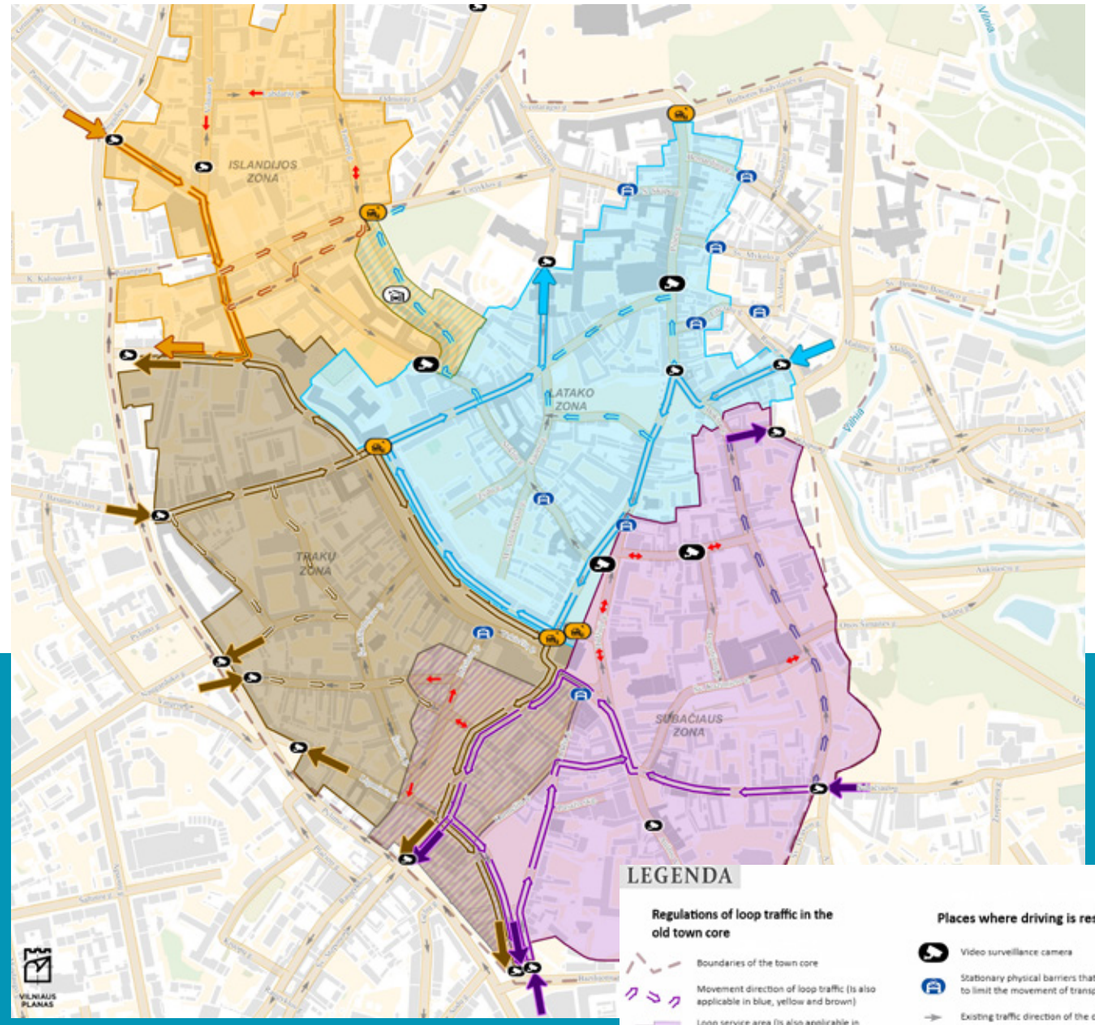
In 2019, transit traffic in Vilnius accounted for 49% of trips in the morning and 42% in the evening, which had a negative impact on quality of life, leisure, greenery and the condition of heritage buildings.

THE SOLUTION: A TRAFFIC LOOP AS A FIRST STEP TOWARDS A LOW-EMISSION ZONE

Approved in December 2018, the city's Sustainable Mobility Plan establishes the need for a "traffic loop" to reduce transit car traffic through the Old Town streets of Vilnius, as a first step towards the city introducing a low-emission zone. The traffic loop regulation was implemented by introducing one-way traffic, regulatory road signs, intelligent traffic systems, a 20 km/h speed limit and physical barriers such as flower beds, temporary trees and bushes. In total, four one-way loops were established to organise the traffic of cars entering and leaving the Old Town, each zone having only one main entrance and one or two exits. Only public transport vehicles can use the loops in both directions, with convenient passenger pick-up/drop-off points installed and relevant bus stops provided for tourism.

Driving in the Old Town is allowed only to homes, workplaces and attractions within the same loop. Access is available via smaller streets belonging to one of the four main loops. Information is provided at each entrance and online, and an app provides traffic data Catering establishments benefit from increased visitors, and couriers use bicycles, scooters and cargo bikes, with special areas set up for cycle logistics.

Prior to approving the final loop plan, numerous consultations were held with residents, businesses and other stakeholders, and specialised personnel responded to residents' inquiries in writing and via social media.



Map of regulations of loop traffic and places where driving is restricted in the old town core of Vilnius.

The traffic loop regulation has decreased car traffic, reduced noise and air pollution and improved the quality of life for residents and visitors of the Old Town:

- In 2020, transit traffic accounted for 10% of trips in the morning and 8% in the evening (in violation of the new traffic rules).
- Weekend attraction to Old Town increased by 12%
- Traffic noise decreased by 20%
- Traffic accidents decreased by 40%, with no pedestrian injuries.

Since the end of 2023, loop traffic control has been carried out using advanced traffic monitoring solutions, such as traffic surveillance cameras, which have enabled the removal of physical barriers in the Old Town.

NEXT STEPS TOWARDS CLIMATE NEUTRALITY

As part of Vilnius' efforts to become a climate-neutral city by 2030, it plans to introduce a low-emission zone in the area from 2025. The aim is to further reduce air pollution in the city's most sensitive area and improve conditions for residents and visitors.

Discover the projects of Smart Vilnius:

https://vilnius.lt/en/projects/

TOMORROW'S TRANSIT: PUBLIC TRANSPORT AND AUTONOMOUS FUTURES

Thinking about the future of transport in cities, I see two main areas that need to be addressed today: **public transport and autonomous mobility.** The basis of transport in cities will be public transport. This is shown by the examples of cities such as London or Singapore, which see that there is no alternative with a constant or growing number of inhabitants. Of course, the question arises how this transport should look like. I assume two main elements: integration and automation.

The first one is the integration (tariff, application, infrastructure, sometimes also management) of various means of transport in the city (with the basis of public transport and accompanying electric scooters, shared vehicles, etc.). Of course, we already have such examples today (moderately optimistic, e.g. Helsinki), but it seems that the situation (including the financial situation of private suppliers, e.g. scooter operators) will facilitate this process. Additionally, infrastructure integration will progress (e.g. common charging stations for electric scooters and cars integrated with a bus stop).

It is important to see public transport as consistent with pedestrian and bicycle traffic - which not only improve movement, but also have a positive impact on human health (growing trend of healthy cities in city planning).

The second is automation. We must be aware that individual autonomous mobility will be a big challenge for cities If we replace cars with an autonomous version, cities will face many challenges. First of all, an autonomous vehicle taking us to work in the city center does not have to park there (which means there is no need to have multi-storey parking lots next to the office buildings - and the question is what to do with them?) because it can return home (and, for example, recharge there). Since the vehicle does not have to be parked, the city will lose a tool for controlling the number of cars in the city - paid parking zones. At the same time, morning traffic jams on the way to the city center turn into traffic jams on the way to and from the city center.

In addition, the experience of, for example, San Francisco shows that cities would have to change their urban structure - they do not need so many parking lots, but they need lanes for loading/unloading passengers in front of narrower buildings (some even several). How to do it and, above all, does it make sense? this is impossible to do, for example, in old buildings and in most currently highly urbanized city centers, it would require a change in planning documents. Therefore, it is not in the interest of cities to replace today's cars with their autonomous equivalents and I assume that more and more cities will take actions to hinder individual traffic of autonomous vehicles.

However, there is great potential in autonomous mobility in public transport. We already have many such examples in rail transport (mainly metro), now the changes will mainly concern buses. Firstly, it will allow for a significant reduction in the costs of public transport (driver labor costs). Secondly, it will allow for a change in the traffic management structure - instead of detecting emerging traffic jams (as today), autonomous vehicles will connect (IoT), for example, with road signals or street lighting, indicating that they will be there in, for example, 40 seconds, which will smoothen traffic and improve street lighting (the problem of light pollution).

However, social elements pose a challenge - research conducted in Gdańsk (PL) shows that people would be afraid to send e.g. their children to school by bus without a driver and this, along with legal changes, are the main areas to prepare for the cities.

Professor Aleksander Orlowski
Gdansk University of Technology

https://www.linkedin.com/in/aleksander-orlowski84/

POZNAN'S PIVOT: DATA-DRIVEN MICROMOBILITY HUBS

While Poznan might not be the first city that comes to mind when you think of Polish cities, it's a hidden gem that prides itself on innovation and forward-thinking. Our Smart City Team is leading the charge towards creating a more connected, efficient, and sustainable urban environment. As the Coordinator of the newly established Poznan CityLab, I've had the firsthand experience of witnessing the transformative power of data in reimagining urban mobility.

One of our most promising ventures into this realm is the development of micromobility hubs, with Hop&Go standing out as a beacon of innovation. Mobility hubs represent the next evolutionary step in urban smart mobility, serving as centralized points where various forms of transportation converge. They facilitate seamless transitions between modes of travel, from bicycles and scooters to public transit and walking.

The creation of these hubs is heavily reliant on the use of data. By analysing mobility data, provided by e-scooters companies, we're able to identify strategic locations for these hubs that maximize accessibility and convenience for all city dwellers. Data allows us to understand patterns in urban movement, pinpointing where people are most likely to need connections between different modes of transport.

Hop&Go, in particular, exemplifies our commitment to leveraging technology to enhance urban life. It's not just about providing more transportation options; it's about integrating these options into a cohesive system that supports sustainable and efficient urban mobility. Through the analysis of usage data from e-scooters and other micro-mobility devices, Hop&Go is tailored to meet the specific needs of Poznan's residents and visitors, ensuring that the mobility hubs are positioned where they can provide the greatest benefit.

The importance of data in this endeavour cannot be overstated. It's the foundation upon which we build our understanding of urban mobility needs and the basis for our planning and decision-making processes. Data informs every aspect of the mobility hubs, from their design to their operation, ensuring that they serve as effective components of Poznan's broader smart city strategy. As we continue to develop and expand the Hop&Go initiative, the role of data will only grow. Our aim is to create a dynamic system that can adapt to changing mobility patterns and emerging transportation technologies. By doing so, we're not just planning for the city's current needs but anticipating the future of urban mobility.

In Poznan, we believe that smart city solutions, like mobility hubs, are crucial for enhancing the quality of urban life. They reflect our commitment to sustainability, efficiency, and inclusivity. As we look to the future, it's clear that data will remain at the heart of our efforts, guiding us towards a smarter, more connected city.

Let's not forget about the aspect without which it would be impossible to lead this process – interdisciplinary cooperation between city hall departments, city units, e-scooter companies/operators, and residents. Our Municipal Road Administration performed a massive work here, and we didn't say our last words. This is merely the beginning of our ambitious journey towards redefining urban mobility. With every step, we inch closer to a future where every resident of Poznan can navigate the city with unprecedented ease and efficiency. The collaborative spirit that fuels our initiatives today lays the foundation for the groundbreaking projects we aspire to undertake tomorrow.

Olga Dzieciatkowska
Coordinator of Poznan CityLab, Poznan City Hall

www.poznan.pl/smartcity

SMART SAFETY: TECHNOLOGICAL ADVANCES IN URBAN MOBILITY

Imagine a century of innovation, three generations of visionary leaders, and a commitment to shape a brighter safer future – this is the legacy of Macq, a high-tech excellence company nestled in the heart of Brussels in Belgium. This family-owned company celebrates its 100th anniversary as an architect of transformation, dedicated to pioneering the next wave of mobility technology.

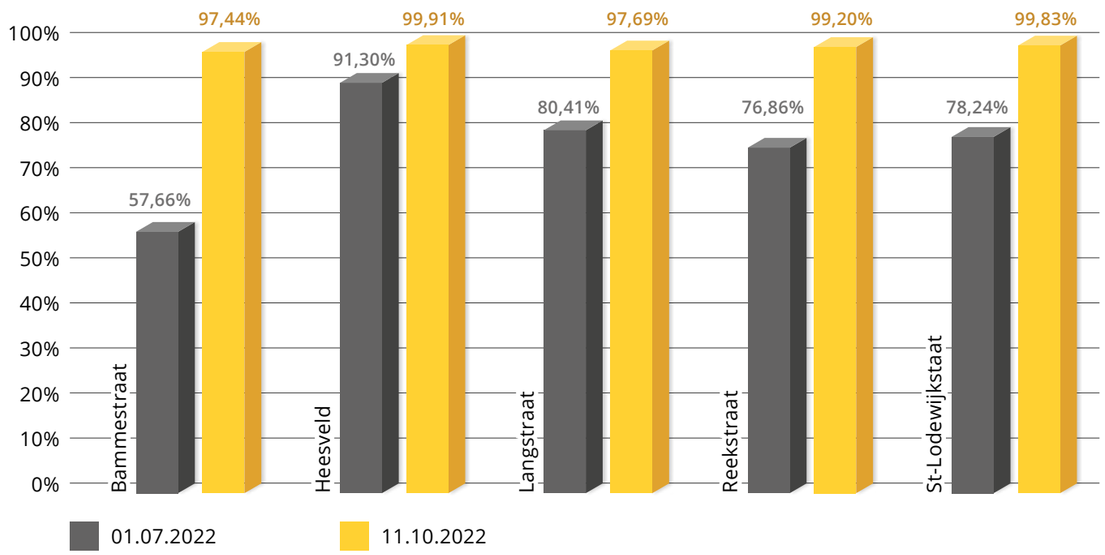
In the realm of smart road cameras, software, AI, and data, Macq, though medium-sized, stands shoulder to shoulder with industrial giants for its unique state of the art technologies. Every year, it is involved in five research projects in partnership with Belgian and European universities, in order to support the next generation of engineers and remain at the forefront of technology.

The main objectives of Macq are to create comprehensive solutions, crafting cities and mobility landscapes that are not just safer and smarter but also greener and more sustainable, building the first steps for a better future. The company has for example equipped Brussels Capital and other leading cities with cutting-edge recognition software and hardware, empowering Low Emission Zones (LEZ). The mission here is quite clear: to cleanse the urban air, to create a better environment for citizens.

Macq provides a spectrum of Smart Mobility and Smart City services, including a dedicated focus on sustainability and road safety. Its partners are mainly public entities but also private, their common denominator is that they need tailor-made solutions that are perfectly adapted to their unique requirements.

A new service recently introduced by Macq is SCaaS (Section Control as a Service) which enables towns and cities with limited financial resources to acquire a high-tech road safety enforcement solution, including cameras and software, without any up-front investment costs. Based on data, it is proven that this solution reduces speeding drastically and changes sustainably the driving behaviour.

Here's an example of the trend in drivers adhering to speed limits in the city of Bilzen (in grey, before SCaaS | in yellow, after the installation of SCaaS):



Macq's section control solution-as-a-service helps to drastically reduce speeding and sustainably change driving behaviour - all at no cost to the municipality.

In only three months, Bilzen city and VIAS (Belgian Road Safety Institute) have observed significant changes in driving behaviour, with fewer drivers exceeding the speed limits. Depending on the location, the gap has ranged from around 10% to over 40%.

Furthermore, according to the Belgian institutional agency VIAS, the average number of accidents can be reduced by 30%, and even by 56% for severe accidents involving serious injuries or fatalities using Speed Section Control solution.

Macq's SCaaS solution is definitely a must-have for any town or city wishing to equip itself with high-performance systems that really make a difference.
In addition, Macq also offers services to restrict access to certain urban areas allowing only certain types of vehicles into a restricted area during certain times of the day. This includes regulating the presence of trucks in villages and controlling access to school zones during specific times for enhanced safety.

In the environmental field, the company also provides an air analysis solution, providing valuable insights to assist in providing effective ecological decisions. Macq's commitment to make mobility more efficient and more ecological extends in providing all political levels with the tools necessary to assist in smart decision making tailored to their specific situations.

In a nutshell, Macq aims to optimize mobility and transport infrastructure by leveraging cutting-edge technologies, ensuring a forward-looking approach to sustainable urban development.

Nathalie Baudry
Marketing & Communications Specialist
Macq S.A/N.V.

Learn more about Macq's SCaaS solution at:

https://mobility.macq.eu/

REIMAGINING PUBLIC SPACES: SOPOT'S PEDESTRIAN PRIORITIES

Krzysztof Jałoszyński
Head of Engineering and
Environmental Department
City of Sopot

www.sopot.pl

In Sopot, we've introduced many ways to calm traffic and improve safety. We've limited the speed to 30 km/h on almost all our streets. We build raised intersections to slow vehicle traffic. We are removing traffic lights and replacing them with roundabouts, which forces drivers to reduce their speed. Out of 65 kilometres of Sopot streets, there are 23 kilometres of bicycle paths connected into a cohesive network with neighbouring cities. Owing to this, we have statistically less than one fatality road accident per year.

However, roads are not only about traffic but also about space. City streets also perform visual, ecological, and recreational functions and are a place to integrate the local community. In Sopot, we decided to combine these functions and a few years ago built one of the first woonerfs in Poland. Parkowa Street was transformed from a traditional two-way asphalt road into an urban garden while maintaining all its existing functions, i.e., pedestrian and vehicle traffic and parking opportunities.

Parkowa Street's roadway was narrowed to one lane, and the space was planted with trees and bushes. Traffic calming measures were put in place along with benches and other street furniture. New improved lighting was also installed. All the solutions were developed during public consultations with residents, so they are now adapted to local conditions and consider the community's needs. Notably, the Parkowa Street woonerf has no roadway or sidewalks: everything is level, with both pedestrians and cyclists having priority along the entire width of the road.

After the redevelopment, the appearance of Parkowa Street reflects its name, as it now looks more like a park than a place associated with vehicle parking.

The woonerf created on Parkowa Street has been recognised in the Society of Polish Town Planners competition for the best-developed public space in Poland. The award committee concluded that "making the seaside part of the city more attractive, creating a new foreground for the cityscape, and directing tourist traffic to this area have allowed the historic architecture to be highlighted. Protecting the surrounding areas from flooding was also a vital project objective."

The project involved a comprehensive redevelopment of the underground infrastructure, with new storm drains built and most of the underground utilities revamped.

AVEIRO'S GREEN VOYAGE: ELECTRIFYING MOBILITY FOR CLIMATE ACTION

For the Municipality of Aveiro, the environment represents a strategic political commitment in the governance, with various actions under development such as the Covenant of Mayors, the world's largest movement of cities for climate action and local energy, of which Aveiro City Council is one of the 10,760 signatories, committing to support the implementation of the 40% greenhouse gas reduction target by 2030, and to adopt a joint approach to mitigating and adapting to climate change.

In the city of Aveiro, we have several projects in progress that will mean the reduction of around 800 tons of CO_2 from the atmosphere from 2023 onwards. Of all these investments, we would highlight the new 100% electric ferryboat, which is operating between São Jacinto and Forte da Barra (less 300 tons of CO_2/year), the investment in electric buses in the municipal public transport operation (less 105 tons of CO_2/year), and the change from combustion engines to an electric system for the 27 moliceiro boats in maritime-tourism operation in the canal central of the Ria de Aveiro (less 400 tons of CO_2/year).

The project to implement the electric charging network for the moliceiros of the maritime-tourist circuits in the Urban Canals of the Ria de Aveiro is in its final stages. We recall that this work materialises one of the various objectives defined in the European Urban Innovative Actions (UIA) project Aveiro STEAM City. The innovation in this project is the conversion of the moliceiros' boats in Aveiro's waterways from combustion engines to electric motors. The other innovative aspect of this project is the transformation of the customer experience (ecological, silent, and more pleasant rides for tourists). Finally, the Municipality of Aveiro is innovating by implementing real-time data collection from the charging stations, the boats' electricity consumption, and CO_2 emissions savings, with the possibility of sharing this data on the municipal urban data platform.

Aveiro City Council has invested in improving air quality and reducing its carbon footprint by investing in 100% electric public transport vehicles (buses and ferries), urban regeneration and green spaces, and the creation of new dedicated cycle paths.

João Andrade Machado
Councillor of the Municipality of Aveiro

Discover Aveiro:
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GLOBAL PROBLEMS, LOCAL SOLUTIONS: MOBILITY AT THE COMMUNITY LEVEL

BLINDNESS
In various sectors of the economy, the ambition has always been automation to optimize transformations, costs, and deadlines. This pursuit extends beyond industry, as the luxury hotel investment world has become a sector conducive to large-scale international production in luxury accomodation with processes and methods aimed at maintaining high standards. The quality of service is inherently tied to personalizing the customer relationship because we are all different, and this necessitates adaptability to needs with a pricing strategy that preserves the development of the business model.

Current technologies allow us to offer products and services to even more customers, thanks to algorithmic automations and artificial intelligence. However, this advancement also runs the risk of overwhelming consumers with digital offers without providing a truly ideal solution. The human being is very often forgotten in calculations, with entrepreneurs prioritizing the concept's ability to raise funds while neglecting the essential. We now have to get into the nails of generalized digitization, regardless of the risks and disadvantages involved. Various experiments conducted by researchers demonstrate how the use of current tools can lead to psychological pathologies, that are sometimes irreversible. Not to mention that public authorities and financial institutions are already making essential smartphones with enhanced authentication and the gradual disappearance of local branches.

But what can we offer to the residents of the future ultra-connected smart city or those in the process of becoming one?

ECOLOGY AND HUMAN RIGHTS
The major challenges related to limiting CO_2 production, except where it is not taken into account, have prompted governments to take radical measures to satisfy organizations composed of militant researchers, whose reports impose immediate decisions at the expense of low- and middle-income populations, and more generally, at the expense of different country economies. To preserve the well-being of populations, it would be more prudent to find solutions before putting constraints in place, especially in an inflationary context.

Philippe Cussonnier
CEO
HubUR

But is it the responsibility of already highly interventionist governments to develop solutions that often only result in the distribution of economic compensation funded by tax revenues or even created debt? Or should it be the role of private initiatives, which are legitimately equipped for such tasks? In addition, local authorities, thanks to significant newly allocated budgets, undertake diffuse initiatives in all directions, but unfortunately, these efforts are often too partial to effectively encourage changes in population habits. This is not a criticism but an observation to raise awareness of the issues to reach genuinely attainable goals.

So, what kind of offer could preserve the interests of populations while promoting a smooth transition towards a more sustainable lifestyle, without additional costs for states and communities?

Our new hydrogen bike can be recharged at home or at the office and comes with its own hydrogen generator.

HUBUR THIRD PLACE 3.0, A "ONE SHOP" SOLUTION
Developing the HubUR concept has been a full-time endeavor for me over the past four years, dedicating myself to it seven days a week. The primary mission has been to address the numerous challenges faced by populations, especially those outside major capitals, and to create a minimum of 6,000 jobs in Europe through the establishment of 3,000 locations. The observation is straightforward: there is an oversaturation of coworking spaces and mobility services in city centers, while there is a genuine scarcity of such facilities outside these areas.

My goal was to conceptualize physical locations that are adapted to each city by offering local services, with the two main activities being flex-office spaces for teleworking and green mobility options for short or long-distance travel. Additionally, to address specific needs in collaboration with local institutions, we propose to complement each establishment with services that are often lacking locally, such as nurseries, organic catering, fitness facilities, technical services, individual storage spaces, and more.

Our fleet of ecological vehicles, that can also be shared, is diverse to meet all transportation needs, and we offer affordable packages that include access to office spaces. Additionally, we provide a version specifically tailored for "business nomads" that includes accommodation. It is inclusive because the European digital platform presenting all the tools is not essential to benefit from our products and services — individuals can simply visit the local branch, book, and/or pay as needed.

Our proactive approaches and technological monitoring will continue to drive innovation and offer even more solutions for our customers, whether individuals, corporations, or institutions. One such innovation is our hydrogen bike, "Boon H2", which will soon be available for sale on our e-store or for rent at our branches, like other green vehicles. Additionally, we are introducing new teleworking methods to enhance efficiency and productivity.

HubUR
Remote offices, green mobility and much more...

https://hubur.eu/

HubUR on YouTube: Click here to watch!

COMMUNITY AT THE WHEEL: POMBAL'S COLLABORATIVE APPROACH TO PUBLIC TRANSPORT

The Municipality of Pombal, situated strategically between Lisbon and Porto in Portugal, boasts not only historical significance linked to the Marquis with the city name but also a central geographical location. Encompassing an expansive 600 km², Pombal extends from mountains to the sea, with the city itself serving as a vital hub where major national and regional roads intersect. However, despite its pivotal position, local sustainable mobility faced challenges, particularly as more than 60 % of the population resides in small villages outside the city centre, resulting in a reliance on private cars and mounting pressure on rush-hour traffic and parking facilities.

In response to these challenges, the Municipality initiated an urban transportation system in 2008, creating an 11 km network with 3 lines focused on the city centre. Between 2008 and 2014, an impressive average of 155,000 passengers per year utilised this network, a staggering nine times the population residing in the parish of Pombal.

In 2019, recognising the need for expansion, the Municipality embarked on an ambitious project to extend the network to the parish of Pombal. The objectives were twofold: to enhance public service and mobility for the population while revitalising the urban territory by influencing road circulation and parking patterns in the city. The initiative aimed to promote mobility from the peripheral areas of the parish.

To achieve these goals, the Municipality adopted a participatory approach, inviting citizens to actively contribute to the planning of the new network. A comprehensive survey, distributed across various demographics, engaged 23 % of the population. Citizens of different age groups, including current passengers, school children, parish residents, industrial area workers, hospital and primary care centre users, and drivers not only participated in the survey but also distributed it to hard-to-reach groups.

In a participatory process of voluntary mobilisation, professors distributed the survey among their students, from kindergarten to secondary education; scouts went door to door to help and collect surveys; and those responsible by companies distributed them among their employees.

This participatory process extended beyond surveys, involving citizens in reflective and co-design sessions. A total of 66 citizens participated in four sessions, analysing the existing situation, envisioning the future, proposing solutions, and consolidating a reference board. The outcome was not only the reconfiguration of the current network and bus stops but also the creation of three new lines and the potential for special and punctual circuits linked to week fairs and cultural events.

The result is an expanded 35 km network with seven lines, now covering the parish of Pombal. Since its implementation in 2020, the network has recorded an impressive 254,000 passengers per year, even considering the challenges posed by the COVID-19 pandemic. This reflects a remarkable 64 % increase in passenger numbers, demonstrating the efficacy of the enhanced network in providing greater mobility, improved efficiency without additional resource allocation, and increased inclusivity by promoting territorial cohesion.

THE POMBUS INITIATIVE STANDS AS A TESTAMENT TO THE POWER OF COMMUNITY ENGAGEMENT IN SHAPING SUSTAINABLE AND EFFECTIVE PUBLIC TRANSPORTATION SOLUTIONS.

Nuno Elias
Chief of Public Space Management and Conservation Division
Municipality of Pombal

www.cm-pombal.pt

MICROMOBILITY AND WALKABILITY: STEPS TOWARDS HEALTHIER CITIES

NOW TELL ME, HOW DO YOU FEEL ABOUT ELECTRIC SCOOTERS?

After the ban of free-floating electric scooters in Paris, one might be tempted to turn electric scooters and scooter rentals into the crucial question for mobility in smart cities. Who is in favor? Who is against? And how can new, smart modes of transportation be integrated into an urban mobility system? The answers are likely to be more evasive and vague than precise and clear. There is no convincing strategy for what smart mobility looks like in cities.

SLOW PROGRESS IN SMART URBAN MOBILITY

Regarding urban transportation and urban mobility, the concepts and solutions in smart cities still appear surprisingly meager. The results so far fall short of expectations. This is surprising because traffic is a major issue in urban areas. Since the first structured and comprehensive population survey in Zurich in 1999, the residents have consistently ranked traffic as the top nuisance in the city. A smart city claiming to improve the quality of life for its residents should be committed to solving this problem quickly and thoroughly.

AT LEAST ONE NEW PROBLEM FOR EVERY NEW SOLUTION

However, all previous attempts to address the traffic problem in cities with smart approaches have led to at least as many new problems: Concerns about safety, aesthetics in the cityscape and questions about their sustainable use might outweigh the advantages of easy and fast use of free-floating scooter rental systems.

While various transportation services from Uber to Lift may offer added value to urban populations, the conditions the company offers its drivers have already been criticized twice this spring by the Swiss Federal Court. Future hopefuls like self-driving cars are unlikely to automatically solve the traffic problem in smart cities.

A recent study by the Oslo Transport Association Ruter predicts a 100% increase in traffic in the city for unregulated use of individually operated self-driving cars. But is the situation really so dire for smart urban mobility? Or are we asking the wrong questions?

SMART MOBILITY IS NOT A TECHNOLOGY ISSUE

In reality, mobility in the city is not a technology problem. Urban mobility is primarily a space problem. Parking occupancy sensors, camera-based guidance, and AI-assisted steering systems for motorized individual transport, and similar technological solutions do not have a meaningful impact on the problem. The bottleneck is the available space, and this cannot be addressed by new technology and increased efficiency in the existing system. We cannot move houses further apart and must satisfy the mobility needs of a continually growing population in limited space.

BETTER UNDERSTANDING THROUGH SHARED MOBILITY DATA

But what are the mobility needs of the population in a smart city? And how do they change when new forms of mobility are introduced? Despite our surveys and counts, we do not know enough about this, especially not as much as we could. Unlike with mobility infrastructure, new smart technological solutions however can provide significant added value to understanding mobility. The inherent value of data on individual mobility patterns, for example, is demonstrated by the data-hungry smartphone apps of big tech companies, constantly asking for location access permission.

In Zurich, we are also trying to make mobility data useful for a better understanding of mobility and, consequently, for better control and planning of mobility offerings. In the case of e-scooters, the city administration has obligated the active providers here to share the movement data of their vehicles on a platform with each other and with the city administration. We now know the average number of daily trips, the length and duration of these trips, and the preferred parking locations of the vehicles in detail.

This allows city officials to enforce no-ride zones via geofencing at critical locations or to automatically slow down vehicle speed to walking pace in pedestrian zones. Where the data reveals problems with the chaotic parking of scooters and rollers, interventions can be made with ground markings or information signs.

Complaints from the population are directly forwarded to the providers via the platform. Additionally, the agreed-upon maximum fleet size with the providers can be easily and promptly verified via the data platform.

BAN, LET RUN FREELY, OR SMARTLY REGULATE?

Whether similar approaches have been tried in Paris and the exact reasons that led to the ban cannot be assessed from a distance. Also, how long the ban will last remains to be seen (in Switzerland, in the canton of Grisons, there was a government-imposed ban on driving cars from 1900, which was lifted a quarter-century later).

In my opinion, all new so-called smart solutions to the mobility problem should be analyzed intelligently, comparing the pros and cons, allowing for tests and public discourse while avoiding the populistic extremes of unregulated laissez-faire approaches and strict bans. There has to be a third, smarter way.

David Weber
Head of Smart City Zurich
City of Zurich

www.stadt-zuerich.ch

PROMOTING WALKABILITY IN THE SMART CITY: INSIGHTS FROM VIENNA

Walking is undeniably the most socially inclusive and environmentally friendly mode of transportation. It produces no greenhouse gas emissions, no noise pollution, nor fine dust. Unlike vehicles, fellow walkers pose no risk to our health. To the contrary, walking daily helps to reach the medically recommended level of physical activity. Walking imposes very little infrastructure requirements on city budgets. The list of reasons why walking should be at the basis of every city's mobility system and promoting walkability a primary concern is long. Still, the reality is often different, and other modes of transportation get more attention.

In a dense and compact city like Vienna, walking has traditionally been at a high level. In the city's 2023 modal split survey, walking made up 32 % of all trips, making it the biggest mode share.

However, even in cities where walking is valued, there's lots of room for improvement. The city of Vienna is committed to increasing walkability and has included it in several parts of its Smart Climate City strategy. Vienna's approach to a smart city is based on the three pillars: quality of life, resource conservation, and innovation – to ensure a holistic, sustainable development. UIV Urban Innovation Vienna is the city's climate and innovation agency and supports the city administration with regards to reaching its ambitious goals. Creating a climate-neutral, socially inclusive as well as space- and resource-efficient mobility system is one of them. Promoting walking plays a big role in this.

When it comes to developing concrete ideas for improving walkability in certain districts, the city's approach is to make individual masterplans for each district. The vast majority of all city districts (20 of 23) already have a masterplan for walking or are currently developing one.

The masterplans use a data-based approach to highlight strengths and weaknesses of the pedestrian infrastructure by analyzing sidewalk width, crash data, shade and heat maps, as well as qualitative data from local stakeholders.

In two of Vienna's 23 districts, Floridsdorf and Donaustadt, a larger program for promoting walkability was launched. The two large districts are located rather peripherally, beyond the river Danube, and are for big parts comparably less dense and less walkable than more central parts of the city. Therefore, the focus of the program was on identifying opportunities for improvement and raising awareness for walking. Between 2021 and 2023, ***LiDo geht*** (= walking left of the Danube) was implemented in these districts, which together have more than 400,000 inhabitants. The intersection of digital and analog analysis and participation methods is particularly remarkable. Mobile phone data analysis was used for the first time to obtain information on the use of the pedestrian infrastructure. In addition, residents were encouraged to use a smartphone app (***GehCheck***) to report deficits but also to suggest improvements and locate them on a map. More than 600 reports supported the analysis.

In addition to generating data for the two districts' so-called "masterplans for walking" that were subsequently created and recommend measures for infrastructure improvement, in particular, the data was also used for the ***LiDo map***, which shows the most beautiful pedestrian routes through the two districts. A highlight at the end of the project was "12 hours of LiDo" - a summer day on which walkers could explore or even go around the districts on a 55 km trail within a 12-hour time window.

The experience from Vienna shows that creating and maintaining a walkable city is a never-ending project in the best sense, and that digital technologies can enrich and support our approach to urban planning and citizen participation.

UIV - URBAN INNOVATION VIENNA
Christoph Singelmann & Thomas Vith

UIV - Urban Innovation Vienna is the City of Vienna's climate and innovation agency and a place where answers to the most pressing questions of our time are being developed. UIV is proud to support cities around Europe with expertise from Vienna on topics such as renewable energy, mobility, urban development, digitization, sustainable real estate and neighbourhood development.

urbaninnovation.at

Further links:

Smart Climate City Strategy (German/English)

Masterplans for walking (German only)

Project „LiDo geht" (German only)

FARO'S FORWARD MOTION: EMBRACING MICROMOBILITY FOR URBAN RENEWAL

Discover the municipality of Faro and its approaches to sustainable mobility:
www.cm-faro.pt

As the first tentative rays of sunlight struggled to pierce through the grey veil of a gloomy Singaporean morning, a splash of colour emerged from the city's bustling streets. Within one month at the beginning of 2017, Singapore received the second bike-sharing fleet, the first move in the international expansion of Ofo, the ill-fated giant that peaked in 2018 with a total volume of around 2 million bikes covering 250 cities in 20 countries. It wasn't the first bike-sharing scheme nor the first free-floating solution, but it was of a new breed - fuelled by venture capital (VC), taking advantage of the smartphone era and addressing user demands in disregard for regulators and public space.

That picture rendered the debut of a new mobility solution, Micromobility. A lightweight offering to fulfil first/last miles that, in a span of less than 10 years, has known a set of boom-bust cycles, spiked public debate, and brought forth a notable set of advancements in the fields of mobility, regulation, and tech normalisation. This, while in the background, the share of the world's urban population grows, as also its demands for greater autonomy and environmentally sound options.

In the case of Faro, the district capital in southern Portugal, the city council set the stage and onboarded scooter sharing in February 2019 (first Voi and later Flash/Circ). Although uncertainty was a given, it was also clear that setting up a traditional third-generation scheme with fixed docking stations wouldn't be feasible in the short term. Hence, putting in place a pilot program became a priority to welcome new operators, understand demand, assess policy and regulatory underpinnings, whilst seating all the stakeholders in regular meetings. These meetings were key in the continual improvement of operations while keeping everyone comfortable and up-to-date as the pilot progressed.

Jorge G Coelho
Chief Information and Innovation Officer at Câmara Municipal de Faro and Visiting Assistant Professor at Universidade do Algarve

In less than 10 months, the pilot made it clear that this new breed of mobility took free-floating to a new level - if setting up shop was quick, jumping off board could be even quicker. First, Voi left, later Circ suspended operations, but the hiatus wasn't big, having Faro later welcomed Bolt, Superpedestrian, and Bird. In hindsight, it became apparent that Micromobility had, to a large extent, beco me a product of the "zurp era" - a period between 2015 and 2019 coined by Palihapitiya, that was characterised by intense VC funding - money poured into a wide range of startups with little regard for their financial viability or long-term prospects. This resulted in a bubble of inflated valuations and unrealistic expectations, which eventually burst in 2020.

Until the end of 2023, Faro had two operators: Bird and Superpedestrian, though the latter folded operations globally just 18 months after the startup raised $125 million in a Series C round.

The scenario isn't bright for Micromobility, but a valuable distance has been covered, with several highlights worth mentioning, ranging from local to international:

- **February 2019** - Faro signed NUMO's shared mobility principles;
- **November 2019** - Los Angeles Department of Transportation (LADOT) open sources the "Mobility Data Specification" (MDS), a digital tool that has evolved and now is key in helping cities to better manage transportation in the public right of way. MDS standardises communication and data-sharing between cities and private mobility providers, such as e-scooter and bike-share companies;
- **December 2022** - The Portuguese Mobility and Transport Authority publishes a comprehensive set of directives for Micromobility;
- **May 2023** - release of MDS 2.0. Besides improvements in interoperability, wider support, and more mobility modes, what comes to city space management, three new data attributes were established: infrastructure type, parking status, and tip-over detection;
- **September 2023** - Paris banned rental e-scooters from its streets following a controversial referendum process, but none-the-less highlighting the challenges posed by inappropriate use of public space;
- **December 2023** - Faro places in public consultation the regulation that will set the framework for a public tender.

As the morning's symphony of raindrops on umbrellas and the distant rumble of traffic fades into the background, the times call for a new chapter in the story of Micromobility. In this new cycle, as companies reassess their business model, it seems valuable to advocate for responsible and sustainable Micromobility practices. Cities need to develop comprehensive Micromobility plans that strike a balance between innovation and safety, given that the technology is available, it seems reasonable to push for the adoption of solutions to improve safety and enforcement. This new contender in the grand scheme of mobility has the potential to be a key component of a more sustainable and equitable transportation future, but we must recognize that it must be done in a way that benefits all users of the public realm.

FROM DATA TO INSIGHTS: MERCEDES-BENZ HELPS CITIES OPTIMIZE PARKING SPACE

Mercedes-Benz has completed a groundbreaking project in Freiburg, Germany, where the company used vehicle data to digitize public parking spaces. The project aimed to map all legally permissible on-street parking spaces in the city using innovative methods. The data was collected from Mercedes-Benz vehicles, which continuously gather information on parking events and scan the roadside for available parking spaces.

Of course, only anonymized vehicle data with the explicit permission of the driver is used. This resulted in around 180,000 data points per day in Freiburg alone, allowing the company to identify and map parking areas, characterize parking spaces, and dividing spaces into individual parking spots.

The data was analyzed using machine learning algorithms, which allowed for the creation of a highly accurate and detailed parking map. An external firm then evaluated the map to ensure its accuracy and relevance. The evaluation included a manual check of selected streets to compare calculated parking spaces with actual parking spaces on the street.

The evaluation was done at two different time points: after a pilot phase in one selected district and after the completion of the project. The evaluation was essential to ensure the quality of the data and the reliability of the machine learning algorithms.

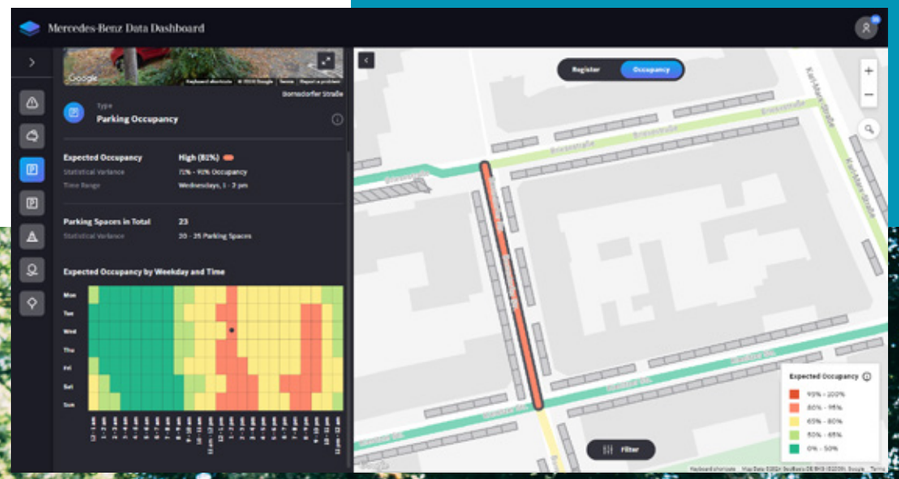
The project's success has demonstrated the potential of using vehicle data to digitize public parking spaces. The resulting parking map can be used to optimize parking space utilization, reduce traffic congestion, and improve urban mobility. The project has also shown the potential of using machine learning algorithms to analyze large amounts of data and extract valuable insights.

With a new project initiative in Frankfurt named "DZwEI", Mercedes-Benz is taking its commitment to sustainable transportation to the next level. The company is partnering with Frankfurt University of Applied Sciences and other companies to develop a prototype technology that analyzes the effects of local infrastructure measures on urban mobility and emissions reduction.

The project aims to evaluate the impact of measures such as bike and pedestrian paths and parking regulations on traffic volume, speed, emissions, available parking spaces, and parking search traffic. The technology will use various data sources, including ultrasonic sensors and parking events from Mercedes-Benz vehicles, to provide real-time analysis of the effects of these measures.

Mercedes-Benz's approach to parking digitization has numerous benefits for urban areas. By reducing the time spent searching for parking, it can help to reduce traffic congestion and emissions, making cities more livable and sustainable. Additionally, the data collected can be used to inform future infrastructure decisions, helping to create more efficient and effective transportation systems.

By using data to optimize parking and traffic flow, Mercedes-Benz is contributing to a more sustainable future for urban areas. With ongoing research and development, the company is committed to finding new ways to improve mobility and reduce emissions.



Parking Occupancy visualized in the Mercedes-Benz Data Dashboard.

Mercedes-Benz AG

Christoph Wolfinger
Product Manager Space

data.mercedes-benz.com

Professor Carlo Ratti
Director, MIT Senseable City Lab
Founding Partner,
CRA-Carlo Ratti Associati

https://carloratti.com

THE MOVING WEB: TRANSFORMING URBAN MOBILITY WITH DIGITAL INTEGRATION

WHAT ARE THE MOST SIGNIFICANT DISRUPTORS IN THE SMART MOBILITY SCENE?
Digital technologies are leading to more efficient urban mobility systems in different ways, driven by the principles of sharing and multimodality. Today's urban mobility landscape is not dissimilar to how the air travel industry looked before the Internet. In that case, the first step was to create a pooling platform for options in real-time. The same could be done at the urban scale – something that we could call the "Moving Web".

Imagine a unique platform that shares mobility information among all transportation providers and, in so doing, creates a more transparent marketplace for online transportation and logistical services as well as a level playing field for all entrants and users. In the future, our cities might be filled with a Moving Web of autonomous vehicles, drones, and other mobile systems. These will be used for transportation, logistics, data collection, and other potential purposes. The Moving Web should combine all services available today as well as potentially similar ones that have yet to be developed. A menu of options based on real-time information platforms could ultimately enable a new mobility regime tied to a constellation of external factors, from ecological footprint to personal health, including walking, running, or biking. Smart electric hybrid motors will transform the cycling experience and bring it online, while personal activity trackers show miles run, walked, or biked.

A broader mix of mobility options in real time would also transform the concept of multimodality. Today, in planning circles, the latter is still thought of as a physical space where different transportation modes converge – say a station for trains, buses, and taxis. But thanks to the Moving Web, it could become a matter of just on-time synchronization throughout the city – a new Multimodality. Hopping out of a bus to take an Uber for the last mile, or leaving an Uber to finally jump onto an O-Bike will be the everyday reality of a new way of interacting with the cityscape.

AS AN ARCHITECT AND URBAN DESIGNER, WHAT DO YOU IMAGINE THE FUTURE OF PHYSICAL URBAN INFRASTRUCTURE WILL LOOK LIKE?
The word "infrastructure" might conjure up images of something bulky and rigid. However, thanks to digital infrastructure, as mentioned before, the future is rather one of "dynamic infrastructure", where we use our roads in different ways at different times, depending on realtime necessity.

For instance, when it comes to road management, we explored this possibility in a project developed by our design office CRA-Carlo Ratti Associati for the city of Paris. This project reimagined Paris' infamous Boulevard Peripherique – a legacy of 20th-century planning that currently keeps social communities apart – using real-time data to turn the highway into new public spaces while allowing commuters to get to their destination more efficiently. We tried something similar in a 2018 partnership with Google's Sidewalk Labs called Dynamic Street, which imagined a responsive, modular pavement that could respond to the real-time needs of the users of the space.

OVER THE LAST YEAR THERE HAS BEEN A SIGNIFICANT SHIFT TOWARDS "PROXIMITY" AS THE NEWEST TREND IN BOTH SMART MOBILITY AND SMART CITY IN GENERAL. WHICH TECHNOLOGIES CAN BE USED TO UNDERPIN THIS NEW DIRECTION?
It's interesting how you mention "proximity" as a factor. At our lab at MIT, we recently developed a project called Proximate, in which we measured the importance of physical proximity in the generation of new ideas by monitoring the communication network of our MIT colleagues before and after the first COVID-19 lockdowns were imposed. As we suspected, and as many of us felt in real-time, our intellectual output was curbed when we were isolated, which is why smart mobility and smart city design must continue to focus on fostering unpredictable encounters in our urban environment.

DO YOU THINK THAT ELECTRIC VEHICLES AND TRADITIONAL MODES OF TRANSPORT WILL CONTINUE TO BE A DRIVING FORCE IN THE MOBILITY SCENE?
Yes and no. They are a driving force but will also foster an evolution of urban mobility marked by an increasing emphasis on diversity and integration of new transport options – including the proliferation of micro-mobility systems that complement EVs and traditional transport by offering environmentally friendly "last-mile" alternatives. As said, they weave a multimodal mobility fabric that caters to the dynamic needs of urban dwellers, promoting a future where the emphasis is on reducing reliance on single-occupancy vehicles and fostering a more connected, mobile society that values proximity and efficiency.

Moreover, these innovations might even usher in new vehicle forms – in a few years' time, the cutting-edge AVs of today might look as outdated as Ford's first Model T looks to us now. We can imagine two directions – larger vehicles, carrying many passengers, and smaller, 1- or 2-seater vehicles. Autonomous buses or minivans would be more efficient than a typical bus system, adapting to changing demand. Meanwhile, human-enhancing technologies enable the development of comfortable, affordable, and comfortable vehicles that integrate vehicle power and mechanics with the human body.

We could even use these smaller and larger vehicles for new functions. Active suspensions and pendulum technology can shield passengers from unwanted acceleration, allowing them to spend in-car time doing other things. Future automobiles may become moving extensions of our homes, as anticipated in 1960s and 1970s architectural utopias. Cars can be used for sleeping, working, eating, and even non-functional activities. In 1972, MoMA displayed Mario Bellini's Karasutra – this vision may soon become a reality!

LASTLY, WHAT DREAMS AND PREDICTIONS DO YOU HAVE OR HOPE FOR IN THE NEXT FIVE YEARS IN TERMS OF SMART MOBILITY?
Fixing traffic congestion would be a start! One way cities have been doing this is through congestion charging, but we need a more dynamic solution to "flatten the curve" – with digital technologies and the flexibility of remote working, there is no longer a need for fixed rush hours where everyone stretches the transport network to breaking point. Again, IoT technology can be of use here – for example, Singapore is in the process of implementing its Electronic Road Pricing 2.0, a GPS-based system that charges users based on the distance they travel and the congestion they create rather than the arbitrary lines they cross.

Singapore's current system is the most dynamic version of the congestion charging concept in operation, but there are many others, including London's recently extended ULEZ and New York's brand new CBD Tolling Programme, rolling out in Manhattan next month.

INTERVIEW: FIWARE AND THE FUTURE OF SMART MOBILITY

FIWARE Foundation is a leading force in open-source, data spaces, digital twins, and smart data models. The organization focuses on driving innovation in critical sectors like smart cities, energy, mobility, water, agrifood, and industry, with the goal of solidifying its position as a global technology leader. The FIWARE Foundation's CEO Andrea Battaglia brings over 20 years of experience in Enterprise Edge, IoT, AI, and digital transformation. His extensive background in the IT industry has equipped him with a comprehensive understanding of the smart city sector and other relevant industries, as well as the ever-changing global technology landscape. Given his expertise, we sought his insights on the future of smart mobility technologies.

CAN YOU TALK ABOUT YOUR SMART MOBILITY VISION AND HOW IT FITS WITH FIWARE'S BIG GOALS?

At FIWARE, we envision a future where city travel is seamless, connected, and sustainable. This vision is driven by our commitment to fostering an interconnected, efficient, and sustainable urban mobility ecosystem. It perfectly aligns with our broader goal: igniting a digital revolution in cities, industries, energy, and agriculture through open-source solutions and standards.

FIWARE technology is the key to smarter urban transportation. It tackles real-time data management, ensures seamless interoperability between different systems, and empowers data-driven decision-making. Our approach goes beyond mere technological advancement; it's about creating livable, inclusive, and environmentally conscious cities for everyone.

WHAT UNIQUE SMART MOBILITY PROJECTS IS FIWARE WORKING ON, AND HOW DO THEY STAND OUT?

FIWARE is at the forefront of developing smart mobility solutions, leveraging cutting-edge technology and fostering open standards and interoperability. Over the past six years, FIWARE has actively supported sustainable transportation. This includes membership in the Mobility as a Service (MaaS) Alliance, contributions to the first version of the German Mobility Data Space, and involvement in projects like Smart MaaS, ***GreenMov***, and ***Nemo.bil***. Recently, FIWARE played a key role in contributing to the standards for the European Mobility Data Space project. This aligns with the vision and goals of major initiatives like the ***Data Spaces Business Alliance***, all working together to drive the adoption of data spaces across Europe and beyond.

What sets FIWARE apart is our commitment to open-source technology and collaboration. Our solutions, such as the FIWARE Data Space Connector and Smart Data Models, are built to be easy to use, secure, and adaptable as cities grow. They're designed not just for today's challenges but to address the ever-changing needs of future urban mobility.

HOW CRUCIAL ARE PARTNERSHIPS IN ADVANCING FIWARE'S SMART MOBILITY PROJECTS?

At FIWARE, collaboration is the driving force. We believe strong partnerships are the key to unlocking the full potential of smart mobility projects. As an organization with a growing focus on smart mobility, we work alongside city governments, tech pioneers, and academic leaders. This collaborative approach, fueled by our open-source philosophy, allows us to combine a vast pool of knowledge, tools, and perspectives. Ultimately, it allows us to address real community needs and drive continuous, sustainable innovation in the transportation sector.

WHAT IMPACT DO YOU SEE YOUR SMART MOBILITY INITIATIVES HAVING ON SOCIETY?

We're confident our smart mobility solutions for projects, initiatives, and the technological market as such will make a big difference in people's lives, especially in urban areas. By making transport more efficient, easier to access, and less harmful to the environment, we're looking at a future with less pollution, cleaner air, and healthier communities. We're also committed to making sure these benefits reach everyone, closing the gap for underserved communities, ensuring that everyone has access to safe, reliable, and affordable transportation. Our goal is to not just advance the tech behind getting from A to B but to ensure that progress leads to a more connected, sustainable, and equitable urban future.

NeMo.bil Project

NeMo.bil is funded with 17.1 million euros within the framework of the Future Investment Programme for Vehicle Manufacturers and Supplier Industry "New Vehicle and System Technologies" ("Neue Fahrzeug- und Systemtechnologien") and runs until June 2026. The aim of the programme is to drive the transformation process of the industry towards climate-friendly drives, fully automated driving, digitalised and sustainable production and innovative use of data. For this purpose, data-based solutions and autonomous driving will be combined with a new vehicle system. Thus, NeMo.bil is focusing on developing an innovative mobility system based on swarm intelligence. This system enables individualized public transport, which should also be affordable for municipalities in rural areas. To this end, data-based solutions and autonomous driving are being combined with a new vehicle system. The latter consists of autonomous ultra-light vehicles ("NeMo.Cab") that collect individual passengers and connect and disconnect from towing vehicles ("NeMo.Pro") on core routes. The novel system is intended to enable resource-saving individual public transport.

Battery Pass Project

Co-funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK), the Battery Pass consortium project aims to advance the implementation of the battery passport based on requirements of the EU Battery Regulation and beyond. Led by Systemiq GmbH, the consortium comprises eleven partners, including acatech, BASF, BMW, Circulor, FIWARE Foundation, Fraunhofer IPK, Systemiq GmbH, TWAICE Technologies GmbH, Umicore AG & Co KG, VDE Renewables GmbH (under subcontract), and a broad network of associated and supporting organizations to draft content and technical standards for a digital battery passport, demonstrate them in a pilot application and assess its potential value.

In 2023, the consortium released the first publicly available Battery Passport Content Guidance aimed at supporting the implementation of the digital battery passport as mandated by the new EU Battery Regulation from February 2027. It provides guidance on reporting requirements for

the responsible economic operators of the battery passport and other participants along the battery value chain and is also of interest for the broader battery passport ecosystem including standard development organizations and regulators. The Content Guidance is an essential element of the project's overall support of the European Union's agenda of a twin transition (digital and green) and towards increased sustainability and circularity.

In March 2024, the Battery Pass Consortium published the first ***Technical Guidance and software demonstrator for the EU Battery Passport*** that provides a framework and recommendations for the technical implementation of the battery passport. The guidance aligns with the EU Battery Regulation as well as the ***Ecodesign for Sustainable Products Regulation*** (ESPR) requirements, proposing a framework that covers the entire battery life cycle, including production, use, and recycling phases.

The Technical Guidance focuses on establishing interoperable, secure, and efficient data management practices to support the digital battery passport system. It outlines majortechnical components, interoperability frameworks, and a methodology for the proposed digital passport system, ensuring it supports sustainability goals while being adaptable across sectors. With the help of the battery passport software demonstrator, some of the technical approaches described in the guidelines have already been verified and implemented as examples.

Andrea Battaglia: "The Technical Guidance marks a significant step forward, attracting private sector investment in batteries technologies and processes, ultimately creating a more circular economy and boosting global sustainability.

FIWARE is honored to contribute its open-source software components and data exchange standards to this project. Our work helped design the recommended principal system architecture, a cornerstone of the Technical Guidance. This work on the document serves as a valuable foundation for future standardization efforts related to the Digital Product Passport (DPP), both within European regulations and globally. Finally, the Technical Guidance serves as a call for all stakeholders to collaborate on preparatory actions, investments, and co-creation activities to unlock this transformative potential."

The Technical Guidance and software demonstrator aim to contribute to recommendations and verification of the technical implementation of a battery passport that shall help to increase transparency and sustainability in the battery value chain through a standardized approach. The document is a valuable contribution to the ongoing standardization processes for battery passports. This regulation applies to batteries in light vehicles, industrial batteries above 2 kWh, and electric vehicle batteries sold in the EU.

By following these standards, companies ensure compliance with both the EU Batteries Regulation and the ESPR. The battery passport's technical aspects, outlined in the Guidance and brought to life in the demonstrator, will serve as a pilot for the DPP and become relevant to other industry sectors such as textiles, electronics, and building materials in the coming years.

In April, the Consortium launched ***the Value of the EU Battery Passport*** study, which presents the first comprehensive analysis of the qualitative and quantitative benefits as well as challenges of battery passports for businesses along the value chain, policymakers, and consumers. Twelve battery passport use cases explore in detail where and how economic, environmental, and social value can be generated by the adoption of battery passports, in a bid to increase transparency, circularity and sustainability in the battery value chain.

Andrea Battaglia
CEO
FIWARE Foundation

www.fiware.org

www.beesmart.city