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Urban multimodal transportation challenges

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2023 key figures





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Major player in Research & Development



More than **40%** of Thales employees working in R&D







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Three core business segments





Session 3 - Monitoring and controlling urban transport and utility systems

Session chair: Lukas Roffel (NL), NAE Fellow and Chief Technical Officer, Thales Netherlands

Urban multimodal transportation challenges

Speakers: Edouard Ivanjko (HR), Department of Intelligent Transportation Systems (ZITS),

Improving Urban Transport by Combining Connected Vehicles, Machine Learning and Digital Twins

Janusz Szpytko (PL), UNESCO AGH UST Chairholder, UNESCO Chair for Science, Technology and Engineering Education, Krakow, Poland

Engineering sustainability inspiration for smarter and greener transportation solutions

Csaba Benedek (HU), deputy director of the HUN-REN Institute for Computer Science and Control, SZTAKI, Full Professor at PPKE

Urban scene perception and environment model synthesis from multisensorial spatial data

Panellists:

🖞 Jiajun Cen (NL), Aquabattery

Peter Lipar (SI), University of Ljubljana, Faculty of Civil and Geodetic Engineering, Faculty Member



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Challenges in the urban environment

> Smart infrastructure

- **Buildings** •
- **Bike lanes & Pavement** .
- Lighting
- **Resource management**

> Utilities

- Energy
- **Air Quality** •
- Waste management
- Healthcare

> Transportation

Traffic management •

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Smart Infrastructure

Buildings Smart grid electrical grid.

Smart buildings can reduce or increase the consumption of electricity upon request, decreasing stress on



Resource management

Smart meters collect energy and water consumption data to analyse and mitigate leak risks.



> Smart

- **Buildings**
- **Bike lanes & Pavement** .
- Lighting Þ
- **Resource management**

Bike Lanes

Streets are being transformed with adaptive lanes for smart biking services.



Pavements

Fitted with sensors so maintenance needs can be pre-empted.



Street lighting

Adapted to weather conditions and based on light data, smart street lighting switches on and off automatically to reduce energy consumption.



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Smart Utilities



Integrating more sustainable sources of energy through distributed energy resources (DER)

> Utilities

- Energy
- Air Quality
- Waste management
- Healthcare •



Air quality

Sensors monitor urban air pollution levels. Thanks to 5G and edge computing, the data collected predicts traffic hazards and air pollution in the city and informs pedestrians and drivers.



Waste management

Bins are digitally monitored to alert waste management companies when full, enhancing sanitary standards.



Healthcare

At home, remote monitoring eases pressures on healthcare organisations. 5G gives clinicians access to real time remote patient information.

In an emergency, a 5G connected ambulance improves patient outcomes by sending vital health data to the hospital before the ambulance arrives.



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Smart Transportation

> Transportation

- **Traffic management**
- Smart connected vehicles
- Smart parking
- Smart transportation



Parking

Real-time availability updates save time, and automated parking payments straight the car dashboard create a stress-free experience for connected drivers.



Smart connected vehicles

In-car eSIMs, sensors and Wi-Fi hotspots keep vehicles connected to 5G networks. This communication improves navigation systems and broadcasts a vehicles position and speed to other connected vehicles to avoid accidents.



European Rail Traffic Management and Digital Enablers











Priority Areas & Exploratory Research

Smart transportation



Digital & Automated up to Autonomous Train Operators

Smart Solutions for Low **Density Traffic Lines**





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Challenges we are currently facing

> System of systems concepts still immature

- > Complex systems model based engineering support still rising in maturity limiting the effective use of digital twins
- > Different deployment states in different segments lead to interface limitations

> Alignment of transportation, mobility and energy (and other utilities) segments not at the required level

> And then AI is coming to town (smart city):

- I. Ethical approaches: As AI permeates every aspect of urban life, ethical questions arise. Have citizens willingly opted in to sharing their data? And are they comfortable with how it is being utilised? Transparency is crucial here. When individuals understand how their data contributes to their daily experiences in the city whether through personalised recommendations, traffic optimisation, or safety measures they are more likely to participate willingly. Citizens need strong assurances that their data sharing serves their best interests.
- 2. Data safeguarding: The abundance of data needed to fuel AI algorithms collected from sensors, cameras, and connected devices will pose challenges for governments and city authorities. First, the sheer volume of data could overwhelm existing systems, necessitating robust storage, processing and analysis capabilities. Second, inaccurate or corrupted data could lead to flawed decision-making affecting everything from traffic management to emergency response. Robust cybersecurity frameworks will be crucial, with government agencies needing to work closely with private sector partners to enhance data integrity, protect against cyber threats, and ensure the secure exchange of information.
- 3. Interconnected systems: A truly smart city isn't isolated: it's an interconnected ecosystem where various components communicate seamlessly. These components could include traffic management systems, energy grids, waste management systems, environmental monitoring platforms and more. Interconnected systems will enhance efficiency and resiliency, ultimately benefitting both citizens and the environment.
- 4. Scalable infrastructure: Future-proof city infrastructure must be scalable. Consider our collaboration with Neural Labs a company specialising in video analysts for smart cities and AI-based intelligent transportation systems. Our Sentinel platform helps Neural Labs to quickly and efficiently automate the creation and issuance of licenses. SaaS capabilities enable them to deploy and update licenses from any location for their customers and resellers helping the business to scale and meet new market opportunities.



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THANK YOU !





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