



SMART CITY

Expo World Congress

07-09 Nov. 2023 - Barcelona

City and Technology



1. Measured

Pervasive sensors
networks throughout
city

2. Networked

Node connections
through low-cost
communications

3. Managed

Real-time analysis &
control of city
systems

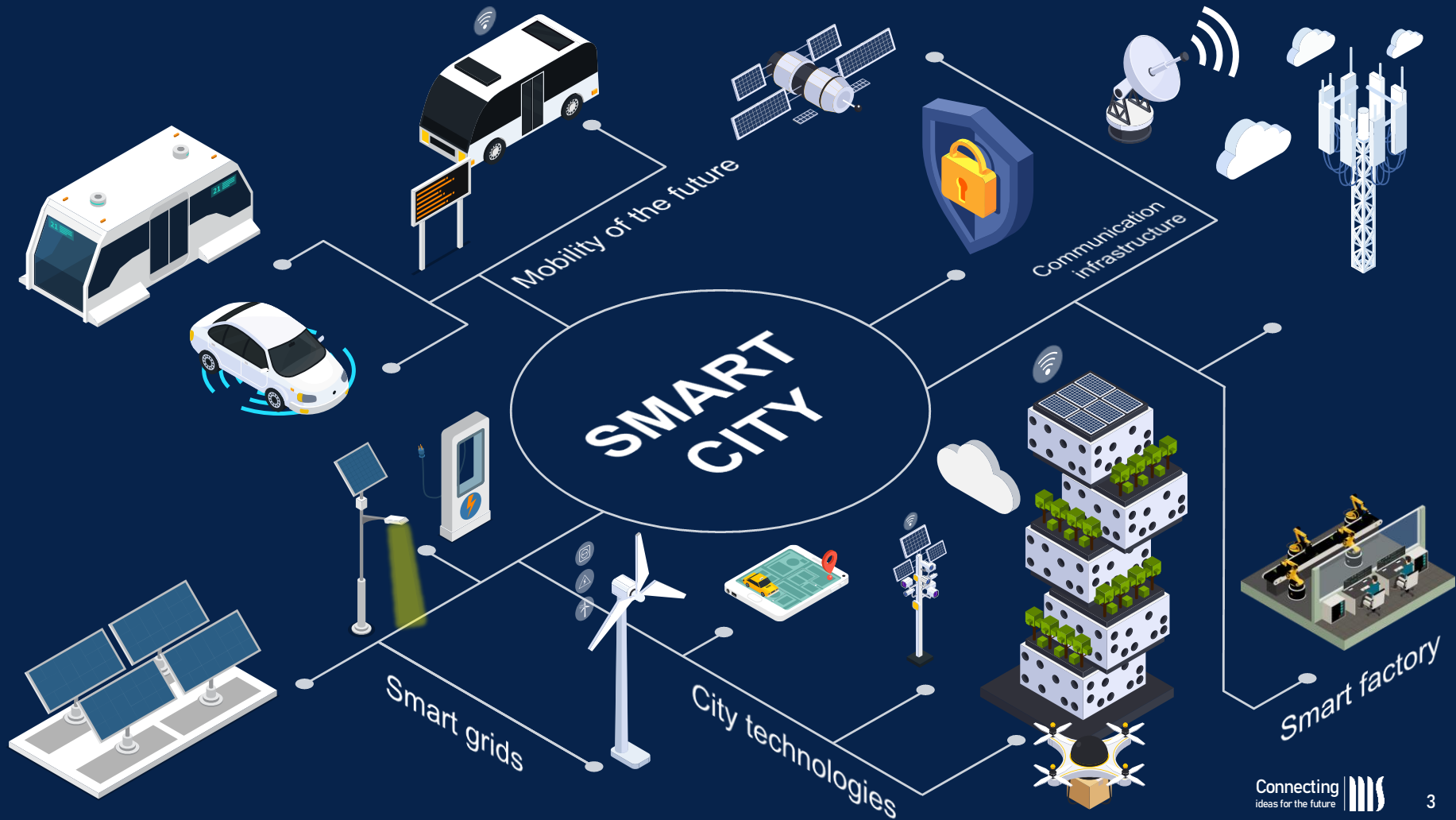
4. Integrated

Integration of
isolated systems and
across cities

5. Smart

SaaS-based citizen
services, applications
and management
tools





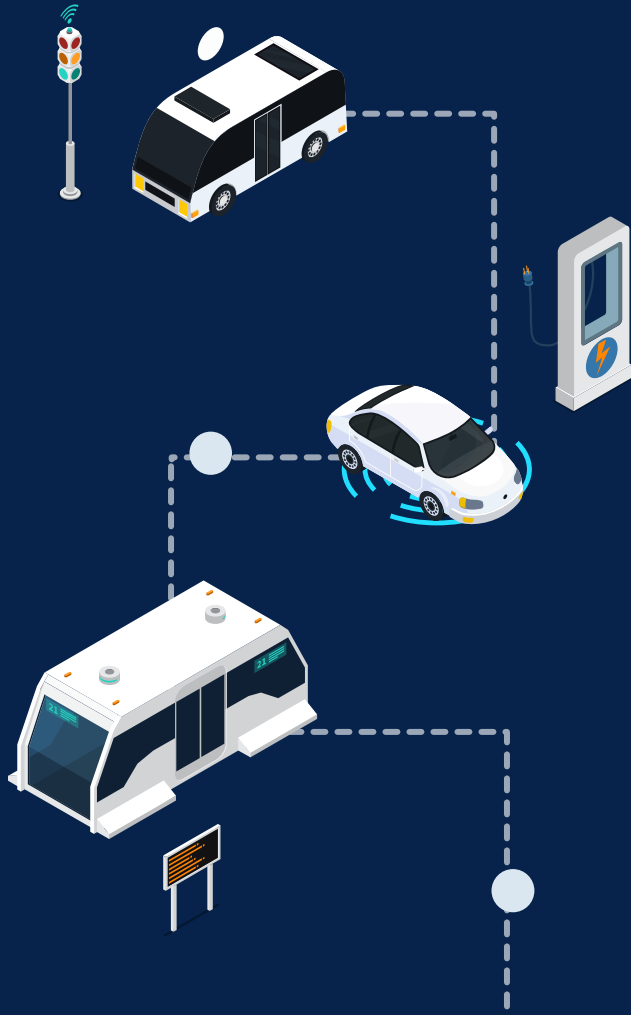


City technologies

Use advanced digital technologies to improve quality of life, foster sustainability, public services

- **Digital connectivity** (Wi-Fi, 5G, IoT, sensors and infrastructures)
- **Intelligent resource management** (manage and monitor urban resources)
- **Smart transportation** (real-time data, mobile applications, autonomous vehicle)
- **Energy management** (Street lighting, BMS¹, Smart Grids)
- **Improved urban services** Deliver better public services to citizens
- **Data and analysis** (Big Data, artificial intelligence)
- **Security** (CCTV, incident detection systems and secure communications networks)

¹ BMS: Building Management System



Mobility of the future

Use technologies to make urban travel more efficient, sustainable and eco-friendly

- **Electrified transport** (EV, PHEV, charging infrastructure)
- **Smart public transport** (electronic ticketing, real-time monitoring, autonomous, semi-autonomous vehicles)
- **Autonomous vehicles** (better security, on-demand mobility services)
- **Vehicle sharing** (bike, car, scooter)
- **Intelligent traffic management** (sensors, real-time data and algorithms)
- **Data analysis and artificial intelligence** (Big Data, AI)

Smart public transport | Autonomous vehicle

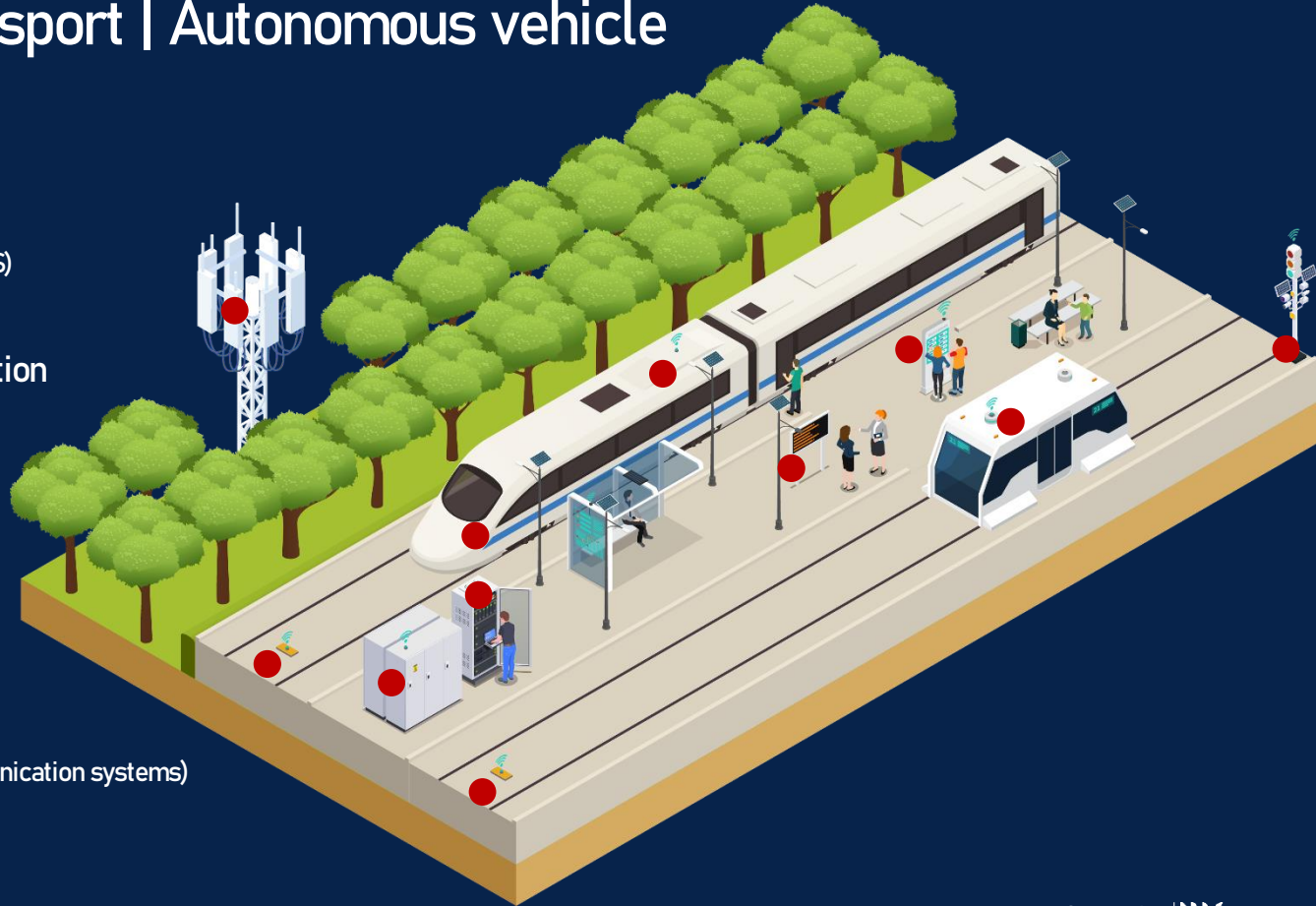
Railway signaling (CBTC, ETCS, ERTMS)

Automatic Train Control & Operation

Energy Saving (traction control system)

Design of intelligent
embedded systems
(DMI, EVC, Passenger Information System)

Predictive maintenance tools
(data analysis/automation, wireless communication systems)



RAILWAY PROJECT

Automatic Train Operation

Automatic and autonomous driving system using data received from railway signaling systems (ERTMS/TMS)





Objective: Provide a secure system to improve train operation (energy savings, operating costs, passenger experience, flexibility) on GoA2/GoA4.

Requirement:

- Software integration with existing systems
- Detect constraints along the route (signaling, obstacles, switches, upstream traffic)
- Interoperability with different manufacturers
- Low resource consumption (processor, calculation)

Technologies :

- C++ (Linux/Windows), Cygwin, Git, SIL0/2

	Preparation for Service	Train Stops	Doors close	Disruption Management
GoA* 1 	Driver	Driver	Driver	Driver
GoA 2 	Automatic	Automatic	Driver	Driver
GoA 3 	Automatic	Automatic	Train Crew	Train Crew
GoA 4 	Automatic	Automatic	Automatic	Automatic

*GoA: Grade of Automation



Smart grids

Optimize electricity production, distribution and consumption

- **Advanced monitoring and control** (sensors, IIOT, smart meters, real-time monitoring systems, network management)
- **Demand management** (Data analysis, algorithms, resources optimization)
- **Energy storage** (battery systems)
- **Improved reliability** (predictive maintenance, problems detection, drone)
- **Cybersecurity** (secure communication technologies, systems hardening)
- **Data analysis and artificial intelligence** (Big Data, advanced analytics, real-time optimization)



RINGO

Smart energy management system

Renewable energies production storage system (wind & solar) capable of discharging the surplus to another location simultaneously into the network.

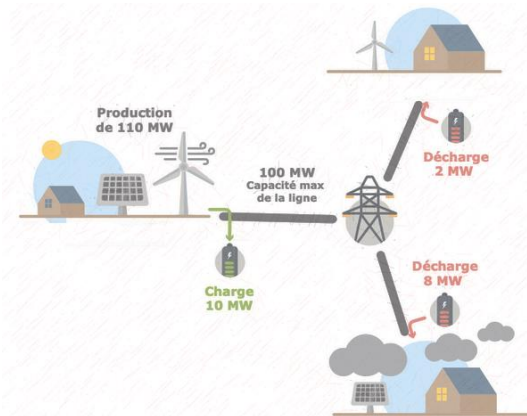
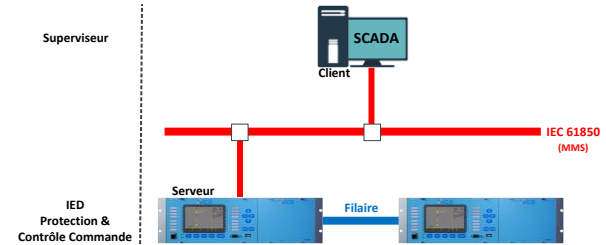
Objective: Designed to protect, monitor and remotely control High Voltage (HV) and Very High Voltage (VHV) transformer substations.

Requirement:

- IEC 61850-compliant MMS communication protocol
- Robust, high-performance software
- User-friendly HMI (Human machine Interface)

Technologies :

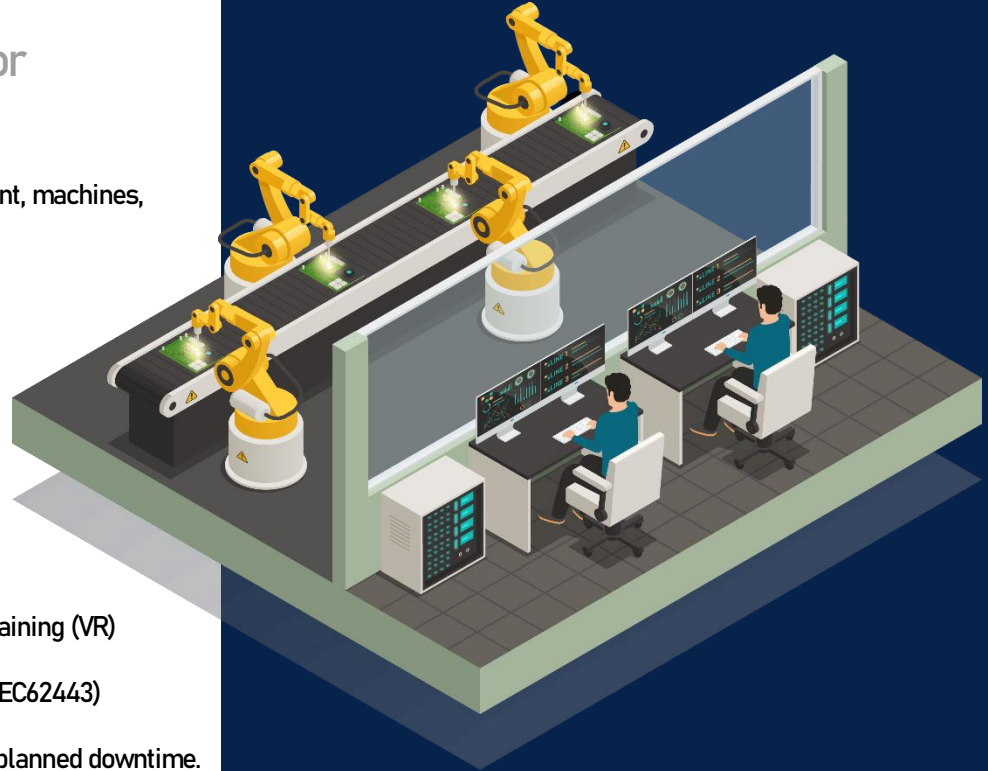
- Linux, IEC 61850, Langage C, Python, GIT, GitLab, Robot Framework, XML/XSLT, Eclipse, CANopen, Grafcet, Mantis

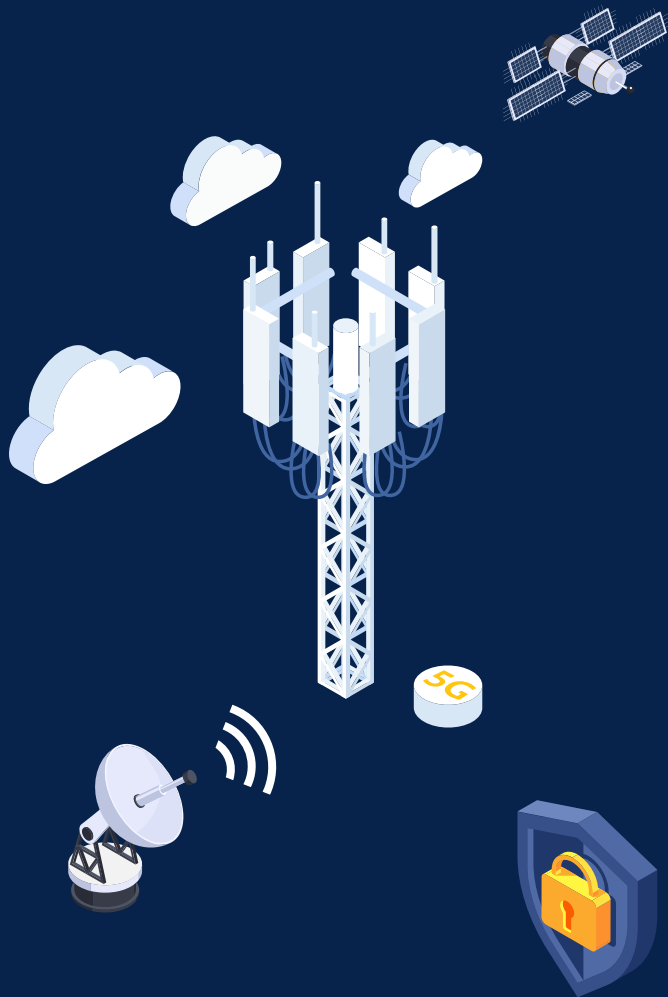


Smart factory

Real-time data analysis and automation for better efficiency and security :

- **Internet of Things (IoT):** IoT sensors to collect data from equipment, machines, products and the factory environment
- **High-speed communication networks** (fiber optics, 5G and wireless networks (Lora, Sigfox, BTLE etc).
- **Cloud computing:** Data storage, analysis (Big Data, IA)
- **Intelligent systems:** Automation systems, (SCADA, PLC, DCS).
- **Human-machine interfaces (HMI):** Touch screens and user-friendly interfaces
- **Simulation:** Computer simulation tools, digital twins, test benches, training (VR)
- **Security and cybersecurity:** IT/OT security solutions (ISO27001/IEC62443)
- **Predictive maintenance:** data on equipment status → reduce unplanned downtime.





Communication infrastructure

A reliable network, essential for the public service

- Data analysis and artificial intelligence
- High-speed networks and connectivity (fiber optics and 5G)
- Internet of Things (IoT): IoT devices (sensors, smart meters, CCTV)
- Real-time analysis (air quality, weather, gas, traffic, water levels, energy consumption)
- Traffic management systems (traffic lights sync., traffic data collection, real-time information for drivers)
- Emergency communication systems
- Security and data protection (robust security protocols and compliance with data protection regulations)

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