

Road2CPS Roadmapping Workshop

Energy and Transport

Short Domain Presentation



Presenter: David Servat

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Smart Energy



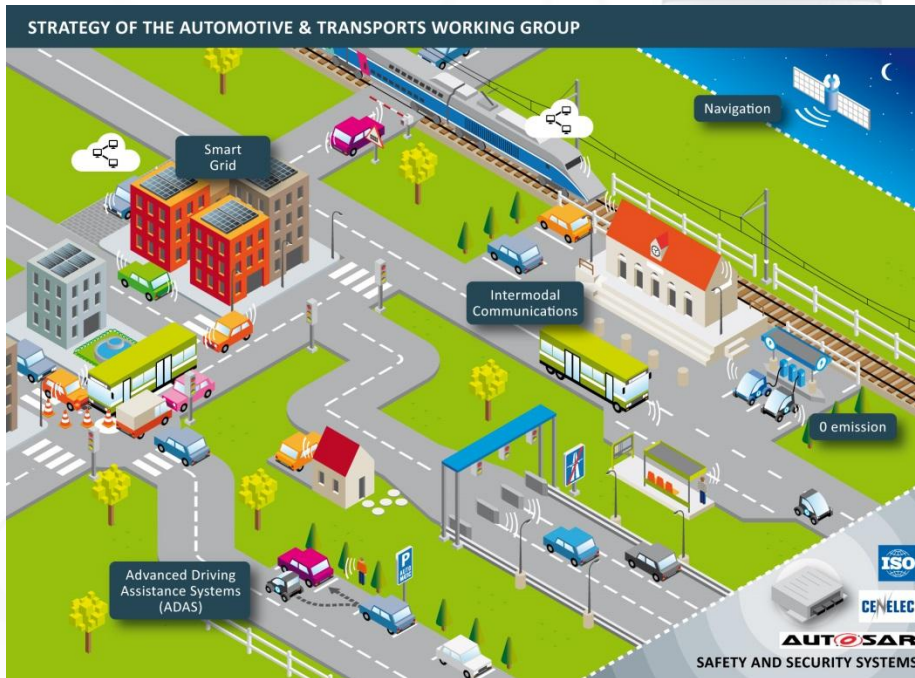
- Key sector: 20% is electric, **energy mix** ahead (CO2 reduction commit.)
- Infrastructures and business models in large **mutation**
- Asymmetrical and centralized network **no longer adequate**
- **New landscape:** distributed small/med. size renewable energy sources
- Need for more reliable short-term **balancing** of supply and demand
- **Storage** means, low-volume energy buffers
- Shift from a supply- to a demand-side management of the grid
- **CPS benefits:** support cross-organizational processes (including individual households and communal distributors) which are key to scale systems to support self-adaption to load-changes
- **Challenges in Europe:** storage, interoperability and standards, regulatory prerequisites ; interdependency with transport and production

Smart Mobility



- Key sector: 5% GDP, 10M employees, **decisive** for citizen lives
- Infrastructure of **growing** complexity in-par with US/China
- Need for tight interconnection between services, inter-modal transport
- Smart logistics (switch : provision of vehicles -> mobility as service)
- Demand for **automated** forms of transport (goods, passengers)
- Societal demand for **safety** and environment friendlier transportation
- **CPS benefits:** support the scenario of automated control and coordination, enabling cooperative logistic processes across individual vehicles or even organizations; optimization enabler
- **Challenges in Europe:** safety, autonomy, legal conditions, cross-border issues, maintenance of railways/roads/signs infrastructures

Domains in a nutshell



Courtesy Systematic GT Mobilité

<http://www.systematic-paris-region.org/en/automotive-transport>

- Smart transportation: ever increasing demand for individual transport of goods and people in a sustainable and safe way: **mobility as as service**
- Smart energy: decentralized and cooperative coordination of the electrical grid, facilitating stable integration of renewable energy resources, and enabling new, sustainable added-value services for operators and end customers

CPS enable to control and coordinate physical and organizational processes on a local and a global scale via the use of information and communication technology.

CPS benefits in a nutshell

- Complexity is caused by the need to simultaneously address the often contradicting requirements of physical and organizational as well as local and global processes.
- **smart traffic systems** encompassing the velocity control and distance measurement in the individual vehicle up to the traffic management of a large-scale telematic system
- **smart energy systems** encompassing the monitoring and control of a single household device or photovoltaic installation up to the trading of production and consumption volumes of complete regions at the spot market
- Additional dimensions: liveness (online reconfiguration, migration, evolution), self-X (optimization, healing)