TECHNICAL SEMINAR

on Advanced Architectures and Components for Next-Generation TCMS

Cross-IP Adoption and Standardisation of NG-TCMS Activities

Presented by Javier Goikoetxea (IP1 Coordinator)

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Innovation in Railways: The Game Changers

1804, the first steam locomotive by Richard Trevithick

1881, first electric tram line by Werner von Siemens

1906, AWS introduced

1912, first diesel locomotive

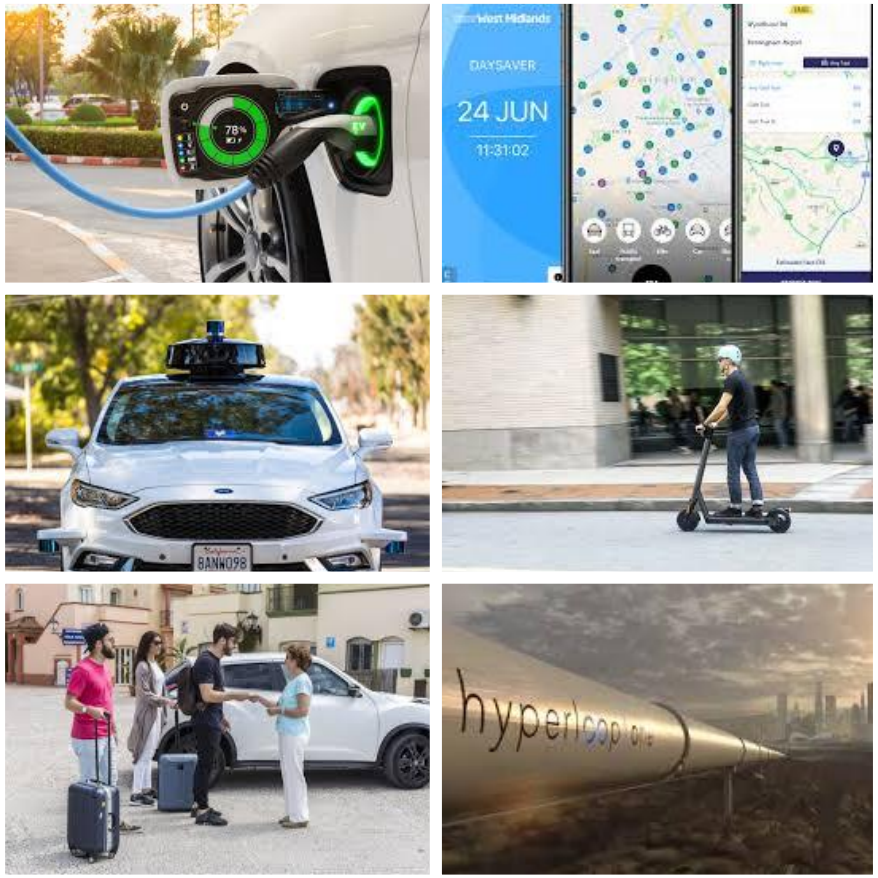
1964, the bullet train between Tokyo and Osaka

1968, first ATO line in London Underground

2020 and beyond

?

Railway is facing new threats…



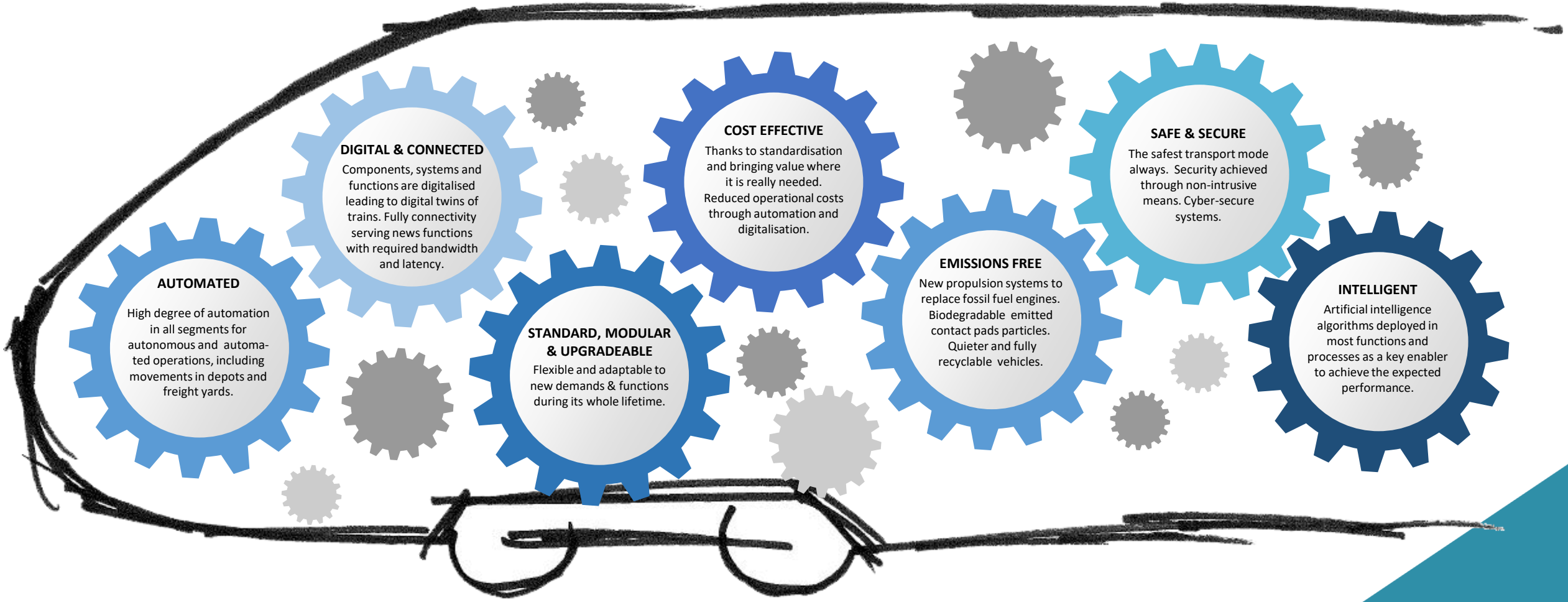
… but also new opportunities

- Environmental aspects
  - Social concern towards the climate change
  - EU Green Deal

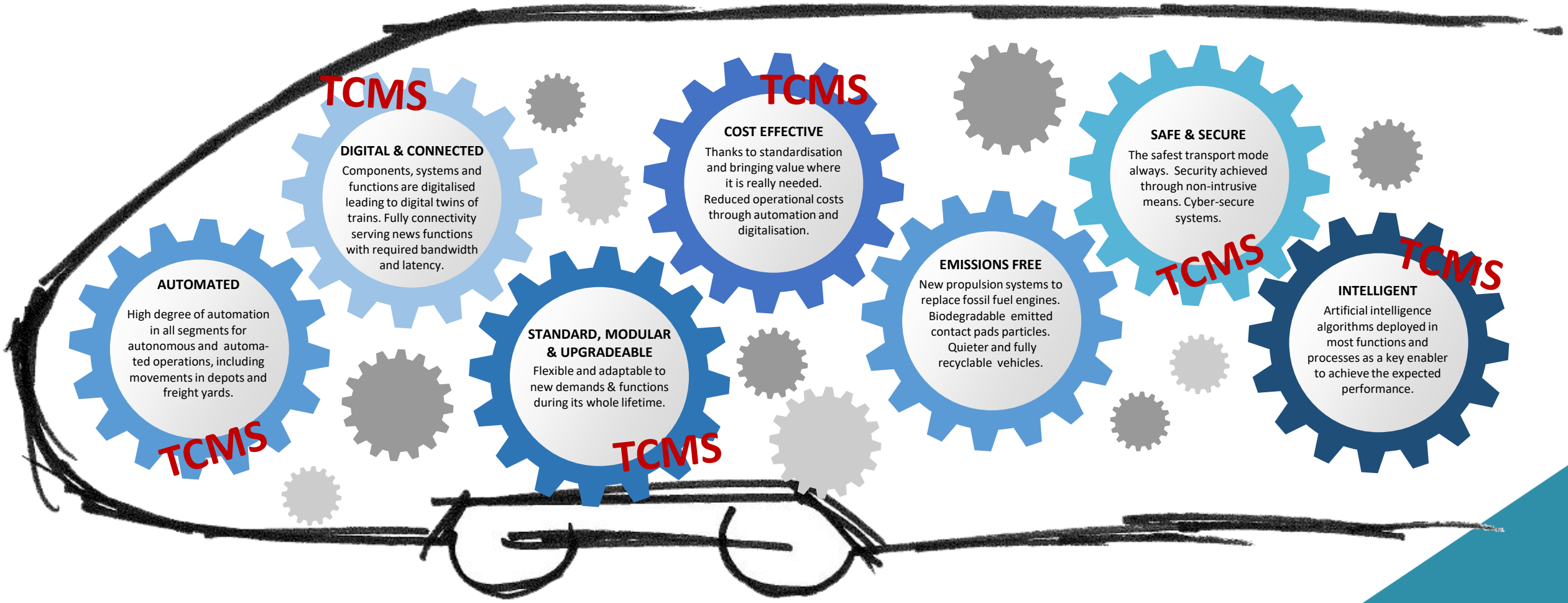
- New mobility concepts
  - Owning a car is less appealing for young people
    - Lost its social rank meaning
    - Cars are very quickly devaluated with high extra costs
    - Time is becoming a precious value, wasted in traffic jams
  - Car sharing, car pooling
  - Funny artefacts like e-scooters

- New technological developments
  - Communications (5G)
  - Sensors
  - IA, HPC

The train of the future (to make railways surviving)



Where the TCMS plays a role…



The two ways for the TCMS

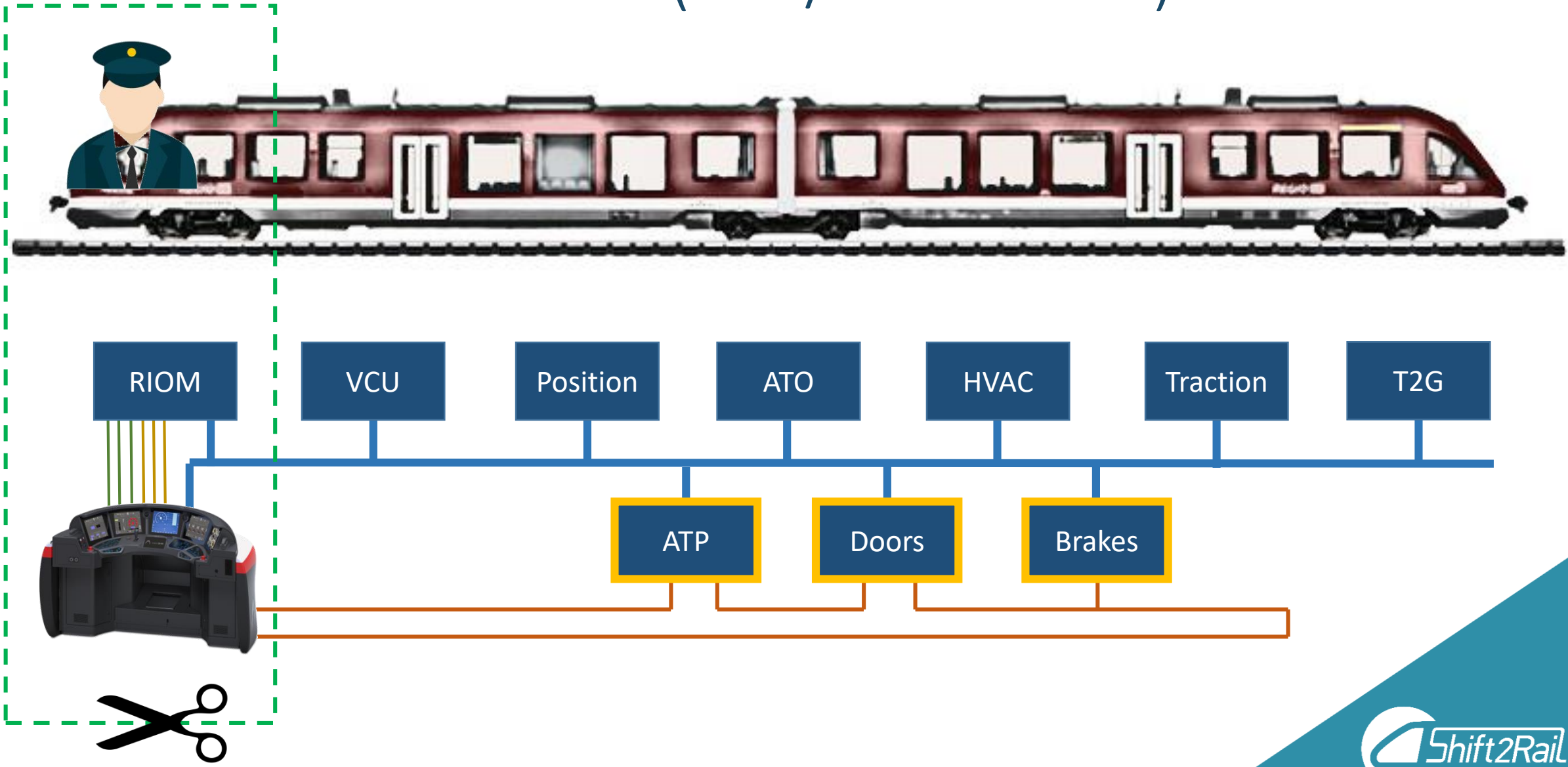
- Component based architecture
- Repeat old fights
  - MVB vs FIP
  - TRDP vs IPTCom vs CIP vs Profinet
- Avoiding safety critical functions
- Letting other subsystems to take TCMS responsibilities over
- Non-standard application interfaces
- Operators not really involved

- Train-wide functional architecture
- Standardised platform consisting of:
  - Modular hardware (COTS) with I/O, communication buses and other HW
  - Middleware offering standardised services to functions (FDF)
- Integrating safety critical functions (mix-criticality TCMS)
- TCMS platform can execute functions from other subsystems
- Standardised application profiles
- Operators playing a key role

Key aspects of the NG TCMS

- Added value relies on functions (“apps”) and not on the TCMS infrastructure (“mobile phone”)
- Standardised integrated modular platform for mix-criticality functions, including transmission over the T2G link, with several “certified” suppliers
- Taking benefit of the synergies with OCORA (https://github.com/OCORA-Public)
- Backbone of the virtual certification of functions
- Core of the train digital twin

Use case of NG TCMS (IP1 / IP2 mixed)



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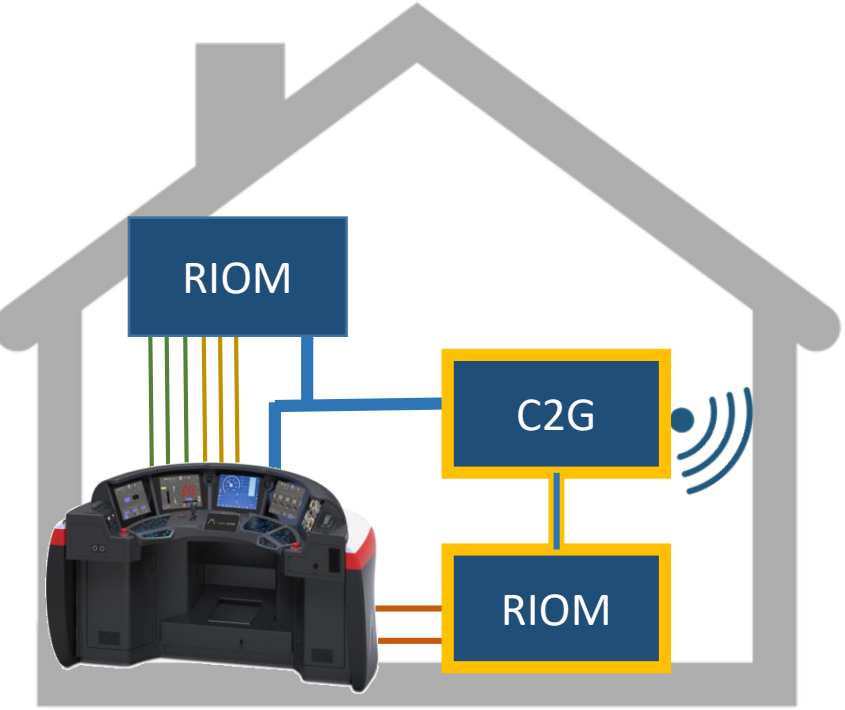
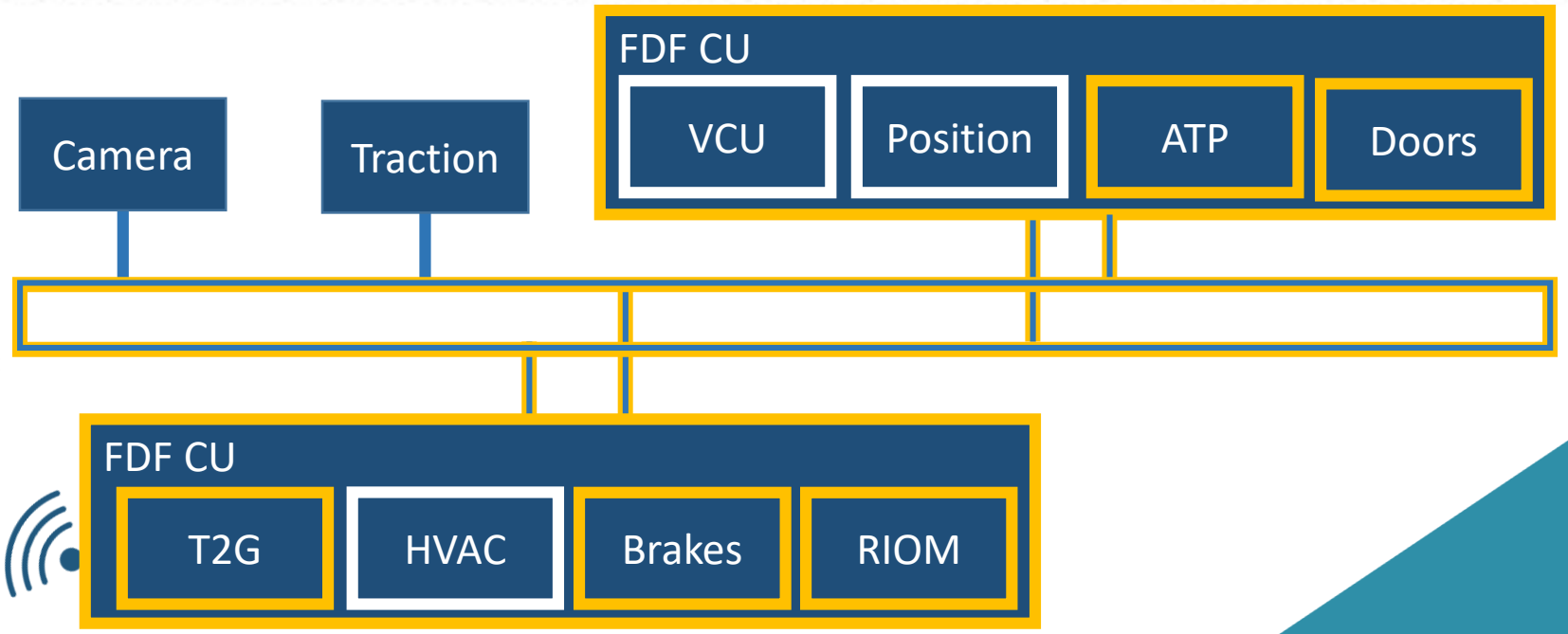
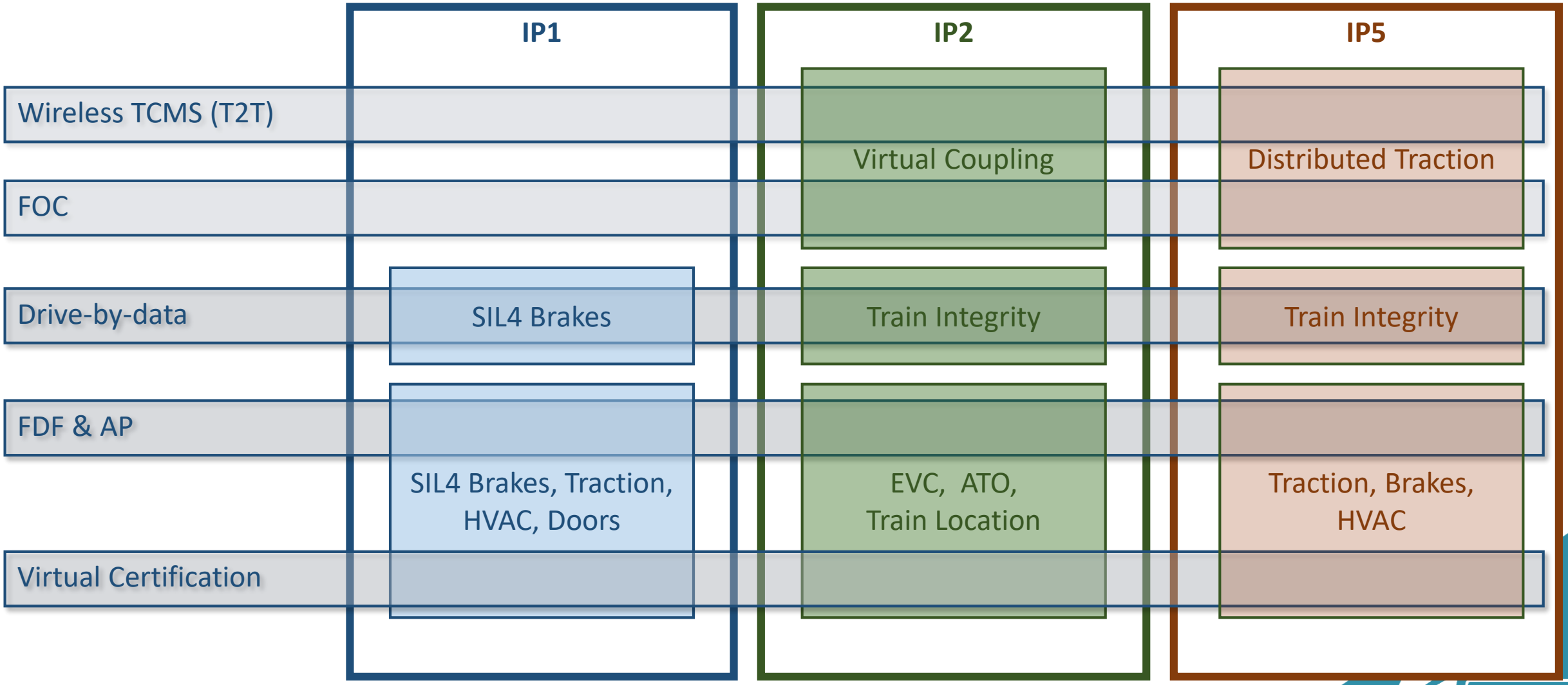




Cross IP use cases (non exhaustive)



Thank you for your attention!

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