Constrained systems:

- Strict normative referential (EN50126/128), specific exploitation rules
- Operator: requirements regarding capacity, performance, safety, availability, and maintainability
- Passenger: comfort, service availability...

Complex systems:

- Heterogeneous systems: Train control, passenger information, maintenance and supervision...
- Users: operators, passengers, maintenance teams
- Distributed intelligence and safety functions

Signalling system engineering:

- Different metier
- Different formalisms
- Concurrent engineering
- Costly validation & verification
- Costly RAMS analysis
- Trace everything!

Need of innovative equipment:

- Safe and available computing units
- Efficiency: more operational needs → more services → more functions
- Genericity: shall be used for different sub-system at a lesser cost

Process and interoperable tools

- Interoperable referential for specification and analysis
- Formal tools for RAMS analysis, verification and validation
- Traceability and refinement of non-functional requirements
- Architecture optimisation (LP, GA...)
- Synchronous language for SW specification
- Capitalize models, components for reuse concern

Innovations

- Multi-Cores: increased performance
- Voting systems: safety architecture
- Redundancy of voting systems: availability
- RTOS: isolation and scheduling of applications
- Middleware: Services, abstraction of the composite structure, abstraction of the lower levels