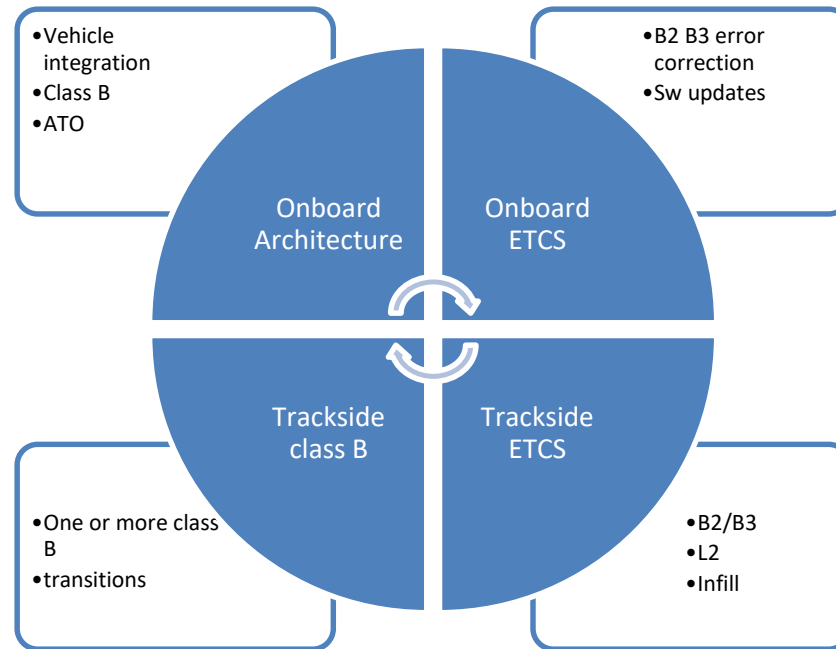


Challenges to ETCS on-board implementation

7th ERA Workshop, Budapest, 02 October 2019
Pio Guido, Head of Railway System Department

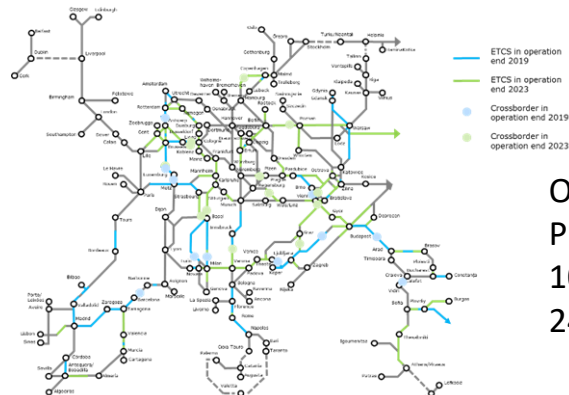


What are the main challenges?



Trackside

- Lack of ETCS equipped lines
- Migration strategy global optimum to equip fleet first
- Dual equipment: one or more class B
- Transitions ETCS <-> Class B



Objectives of the 2009 European Deployment Plan:
10,000 km by 2015
24,000 km by 2020

Letter DG Move Class B to MS



“Interoperable infrastructure

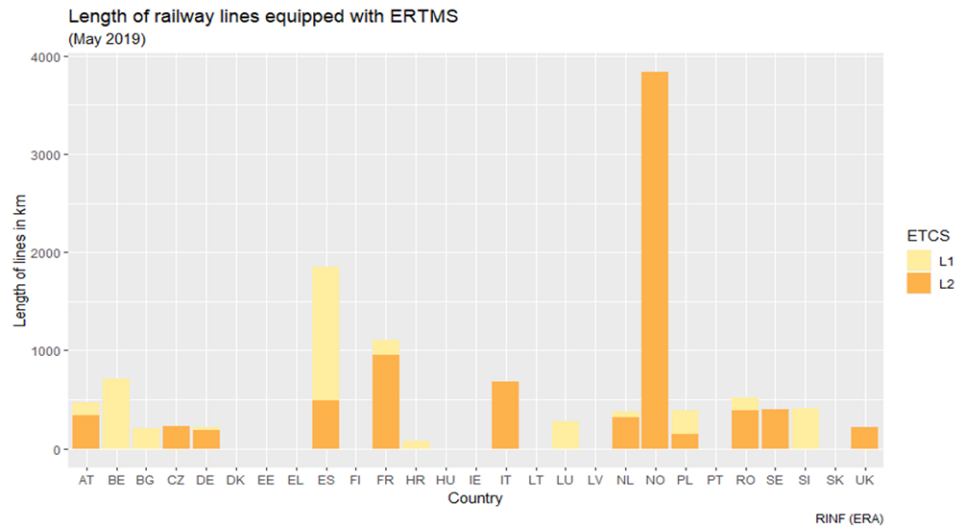
Infrastructure is delivered according to the EDP, according to engineering rules valid for entire networks

For existing ERTMS infrastructure, the necessary investments are made to ensure interoperability. ERA ensures via the ERTMS Trackside Approval the interoperability of trackside ERTMS and that the application of engineering rules are progressively more and more extended in terms of geographical coverage.

By 2030, almost 51,000km of railway lines on Core Network Corridors in Europe in service with ERTMS, allowing a single train with a compatible ERTMS on-board unit to travel seamlessly across the whole European core network.”

Trackside ETCS

- Baseline 2 or Baseline 3
- L1 or L2
- Infill
- National Rules ?





ERTMS MoU signed 2016

clause 6:

“The infrastructure managers and the manufacturers agree to use, for future projects, any set of specifications in the CCS TSI, to implement System Version 1 or 2 (X=1 or X=2) trackside projects being compatible with on-boards which are compliant with the specification #3. Existing trackside installations need to be migrated to be interoperable with on-boards that are compliant with the specifications #3. “

2017 Agency opinion error correction ERA/OPI/2017-2

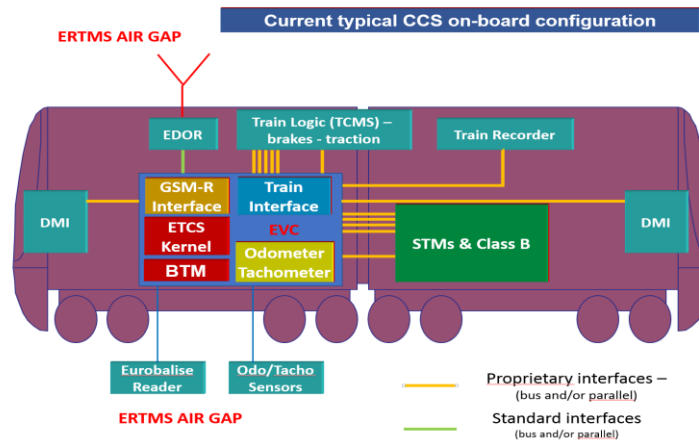
22 CRs, solutions published, request to IM to check implementation and possible impact

On board maintained as software products: scheduled updates with pre-tested configurations ensure errors correction, maintaining all the products and system throughout EU in line with the interoperability specifications. ERTMS error correction not lead to re-authorisation of the vehicle.

Onboard
ETCS

- B2 B3 error correction
- Software updates

What are the main challenges?



- Vehicle integration
- Class B
- ATO
- Game changers

Onboard
Architecture

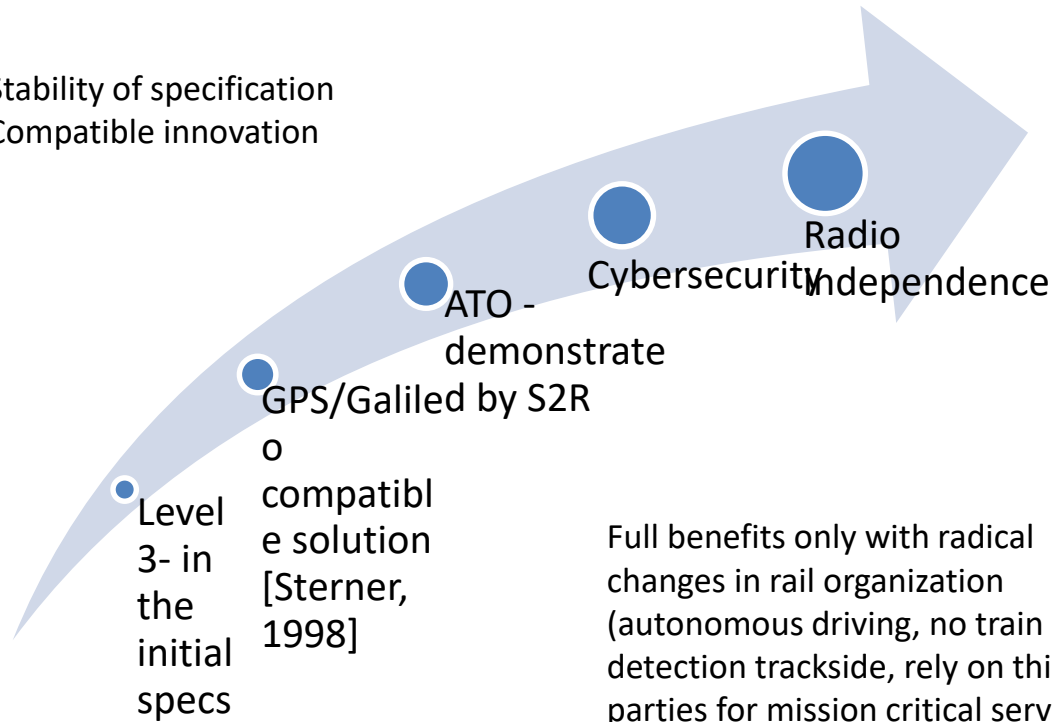
Some ideas abandoned along the years

White box
Pre-fitment
Safety platform
Open ETCS



ERTMS – futureproof ?

Stability of specification
Compatible innovation



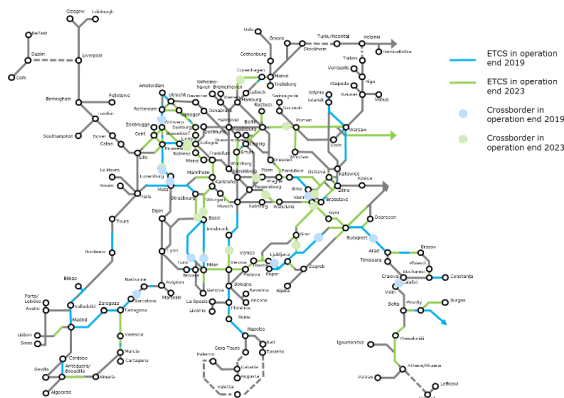
Full benefits only with radical changes in rail organization (autonomous driving, no train detection trackside, rely on third parties for mission critical services, coordinate systems,..)

Changes to TSIs, including introduction of new functionalities in CCS TSI, ensure technical interoperability maintained and enhance operational harmonisation via Level 2/3 deployment

Cheaper, secure and futureproof onboard through:

- Modularisation, with common standardised interface specifications
- Separation of safety-related and non-safety related functions
- Security by design embedded in future CCS development

- To deliver:
- LCC reduction with same standardized components in the whole fleet
- LCC cost reduction by easier maintenance and upgrades
- Less energy consumption by using ATO GoA1/2
- Improved staff efficiency with ATO GoA3/4



The whole Core Network in service with ETCS

Trackside deployed with modular configurations, with few **“types” of implementations covering each network:** out-contracting of field works, maintaining tight control over quality, safety and interoperability.

On-board installations based on **generic product from each supplier**, with **demonstration of ETCS and radio compatibility** reducing the risks and uncertainties of testing in line.

Financial mechanism to balance/compensate costs/risks between Ims and Rus

ETCS positive business case for Infrastructure Managers (especially pure L2)

Upfront cost and risk for RU to migrate the fleet first

ERTMS as software products: scheduled updates managed by suppliers to eliminate errors, ensure interoperability and safety.

ERTMS as backbone for the automation of digital connected rail system: separation of onboard and trackside allows innovation maintaining compatibility: Level 3, ATO, trackside evolution, ...



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