



INFRABEL

Challenges in implementing ETCS Level 2 With Existing Lineside Signalling

Pilot Line Case Study

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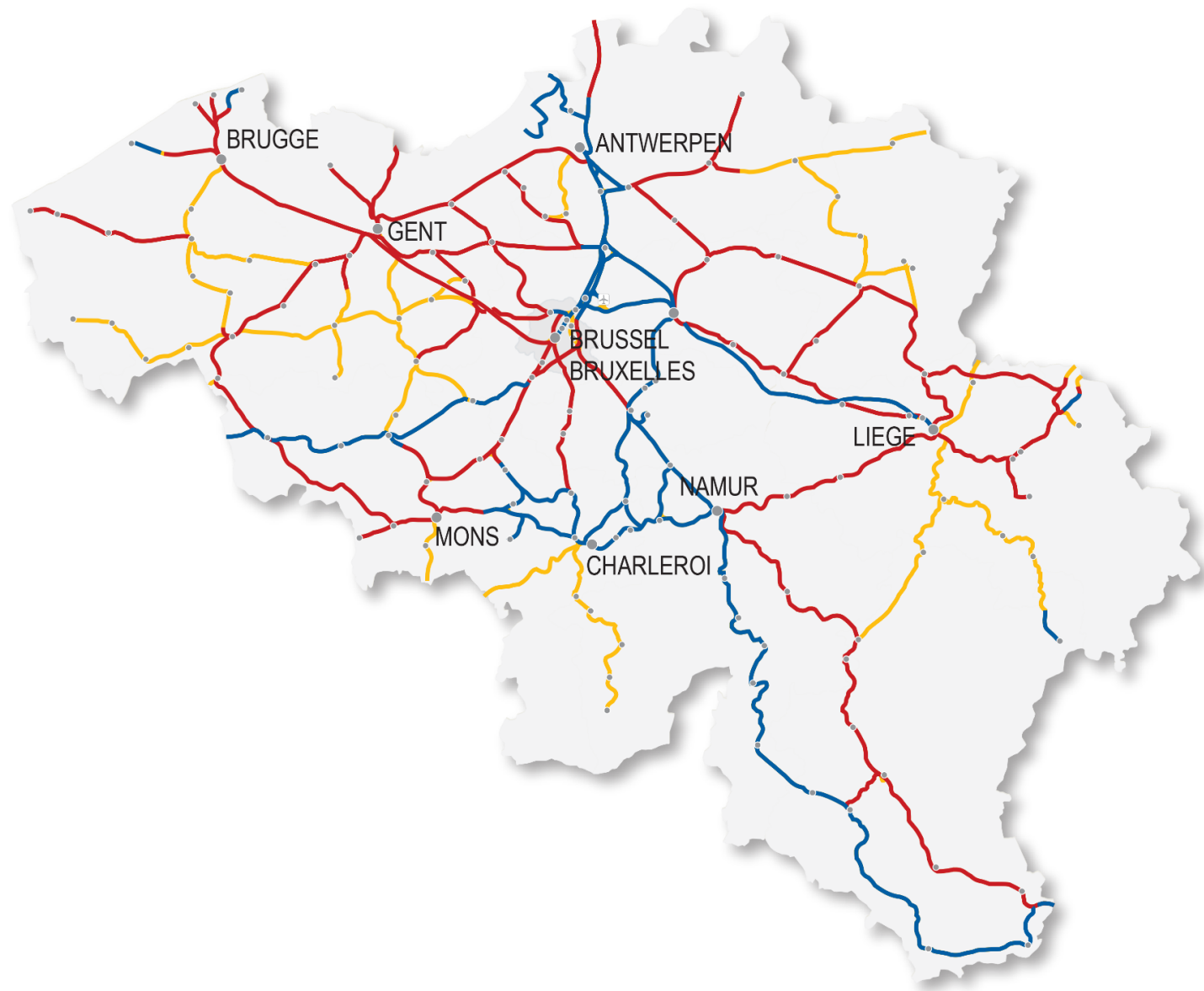


ETCS Master Plan

2025

ETCS Levels

- ETCS L1 FS
- ETCS L2 FS
- ETCS L1 LS



Status roll-outs

2019

ETCS Levels

- ETCS L1 FS
- ETCS L2 FS
- ETCS L1 LS
- ETCS L2 + L1



ETCS2 Pilot line

L73 – De Panne Diksmuide

30 kms

Single track & double tracks

3 stations

1 stopping point

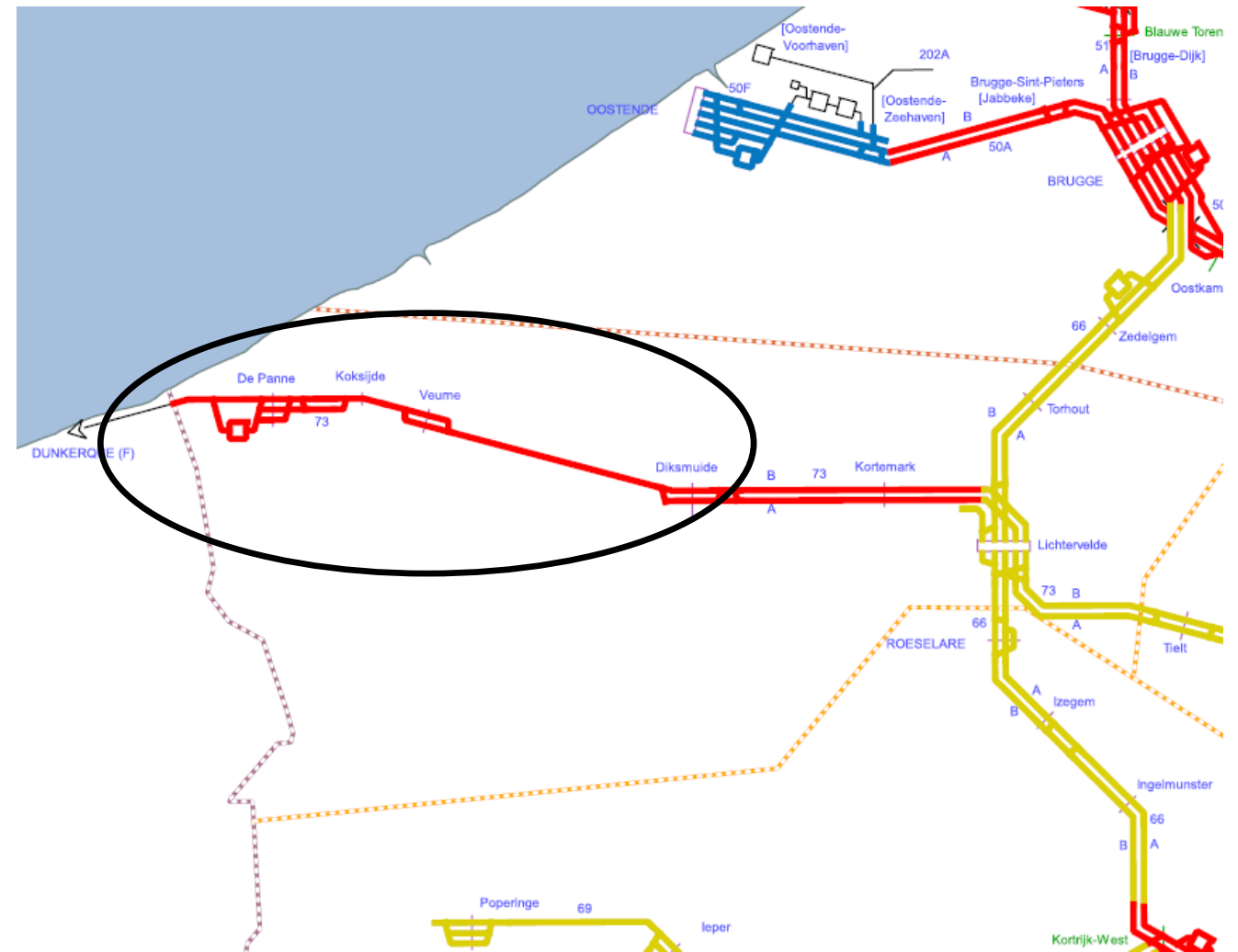
1 shunting yard

Low traffic

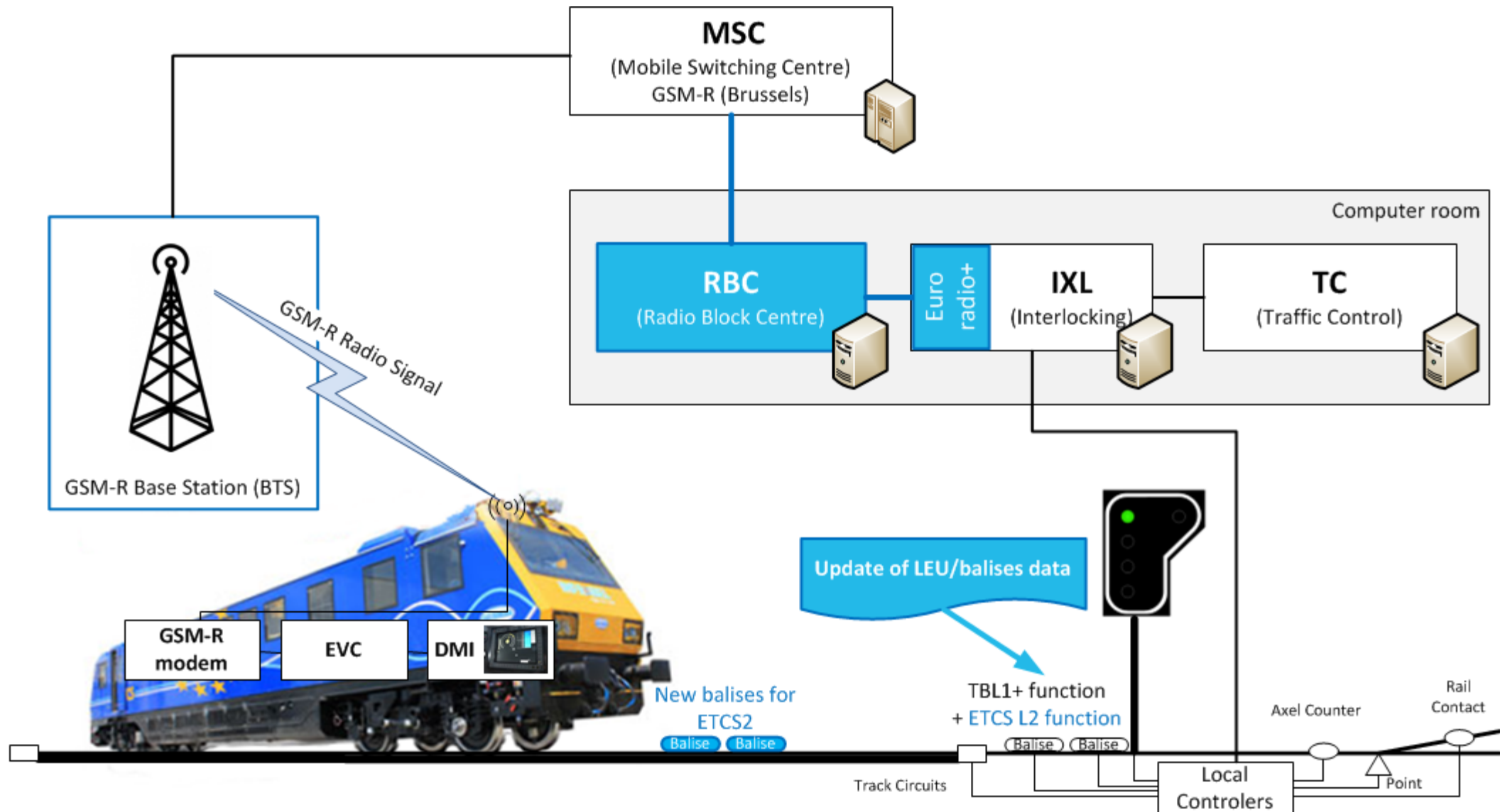
Flexibility for work and testing

SmartLock Interlocking (Alstom)

TBL1+ system (using ETCS balises and LEU)



Technical architecture



Results & key benefits

Infrastructure operations

- 3 years between signing of contract (July 2015) and commissioning of line (June 2018)
- No failure of ETCS2 subsystem
- Degraded modes have been discovered > important input for generic baseline
- Issues to be solved before full deployment

Train operations

- 4 trains/day since September 2018 in ETCS L2
- Positive feedback from drivers
- Reduction of emission by public operators GSM-R due to interference
- RU's have to install filters on their receivers



ETCS L2 works. It shows us how to proceed for roll-out.

Next step: building a **generic application** to deploy **ETCS L2 on 39 projects!**

Challenge 1: ensuring coherence with the existing signaling system

- ➔ Ensuring coherence with **ETCS L1** (in service on other lines) and **lineside signalling**
(same experience as with Level 1, translation of aspects into ETCS language)
- ➔ Safety, availability and capacity performances should **be similar or better**
- ➔ Operational and degraded scenarios are complex to manage



➔ When possible, Infrabel takes benefits of **ETCS Level 2 possibilities** while keeping the functional and system requirements of the existing system (OBU).

Challenge 2: different types of rolling stock

All currently allowed trains continue to run on the lines:



ETCS / TBL1+



Pre BSL 2

Good Brakers



ETCS1 / ~~ETCS2~~



BSL 2

Bad Brakers



ETCS1 / ETCS2



BSL 3



ETCS Level 2 implemented to allow proper level transition for all trains

Challenge 3: brown field implementation vs green field implementation

Equipping existing tracks is much more complex than equipping newly built lines:

- Existing trackside layout limits flexibility
- Compatibility issues between existing signalling elements and ETCS implementation
- More itineraries, speed limits, and operational scenarios



Technical possibilities of ETCS Level 2 could not be completely used.
Trackside and Interlocking updates were required to implement Level 2.

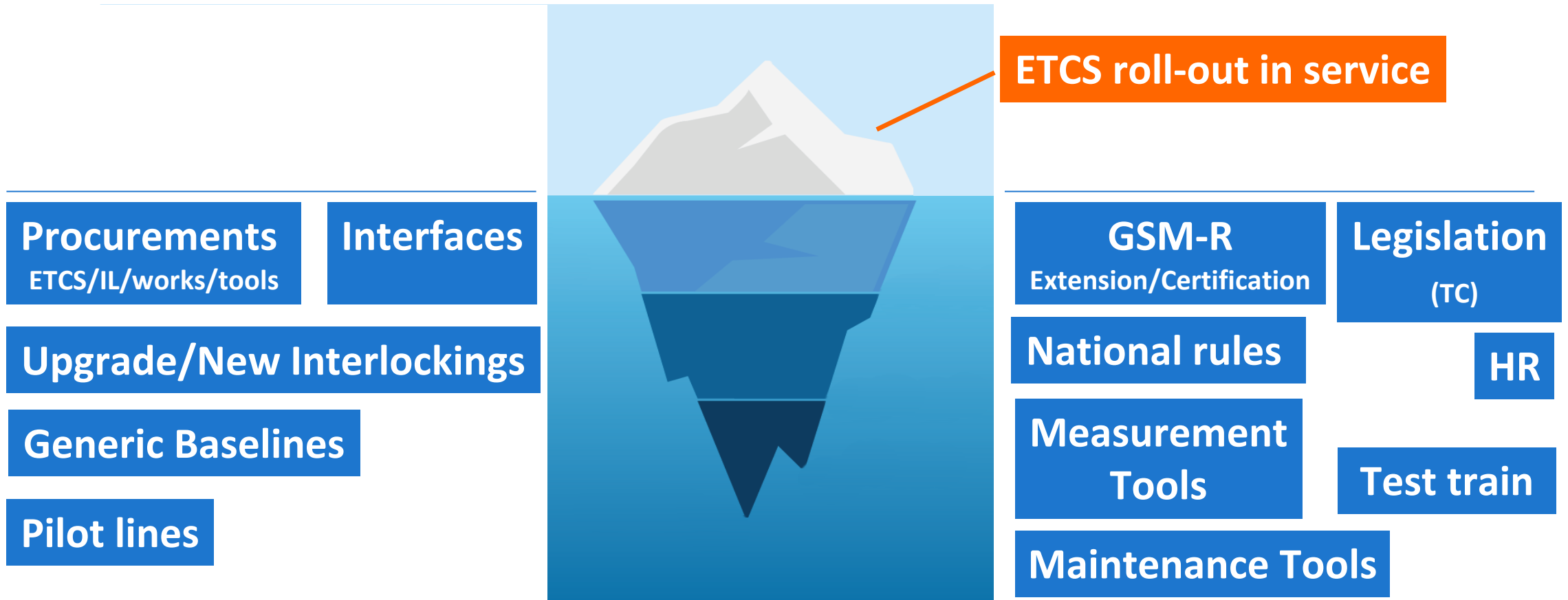
Hard lessons ETCS2

- Full turnkey approach is not possible for brown field scenario : supplier needed lots of support (e.g. national signalling principles).
- Unexpected update of RBC software needed for compatibility with existing signalling (1 year per release)
- Certification ISA / No-Bo is making ETCS development even harder and more expensive
- Safety is not only a standard but also a philosophy. Alignment between stakeholders (internal, assessor, supplier) is needed.



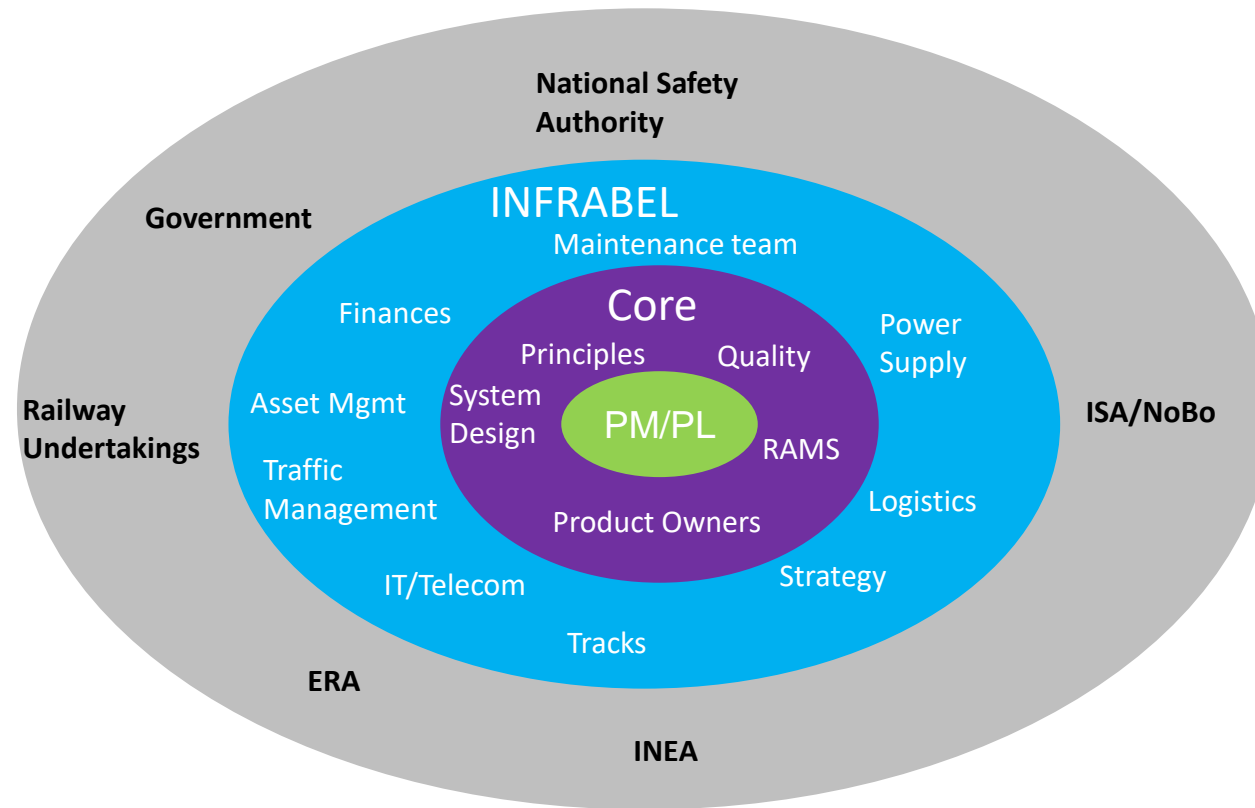
ETCS L2 is not yet at its full potential due to migration of rolling stock. After 2025, more benefits by removing the signals and shifting to ETCS L3.

National Deployment : more than the sum of roll-out projects



➔ We had to define and plan (time/€/HR) ALL enablers to achieve the benefits (for us: mainly safety) of the program

National Deployment – the stakeholders challenge



ETCS is not only about signalling change, it implies change for the entire company and has to be managed accordingly

National Deployment – other lessons

IL Renewal for ETCS2

10 to 20 IL projects / year

Work facilities for exterior works

Phasing of projects

ETCS Projects

10 to 20 ETCS projects / year

500 – 1000 km / year

Industrial process requested

Data preparation / Tests
tools not efficient

Human Resources

Big need of specific profiles
(e.g. design engineers...) and
supporting profiles (e.g.
contract & program
managers)

600 people on the peak
moments (only MP ETCS)

We Need You! (campaign)

National Deployment – other lessons

Transitions + Human Factors

Avoid ETCS Islands

Transitions are very difficult to manage due to all projects/technical constraints

TSI evolutions

Full traceability requested for generic case update if the TSI has evolved !

New certificates for existing Products (balises / LEU) requested if TSI has evolved!

Simplification is needed

Network evolves ➔ ETCS Reworks

Flexibility vs Freezing Infrastructure

Contracts / Planning / Ressources / budget / Outsourcing

Dependency Management with other programs

A photograph of a railway track at dusk. The tracks curve into the distance, with a red signal light visible on the horizon. In the foreground on the right, a signal post stands with a yellow sign that reads "ETCS2". The sky is a mix of blue and orange, and there are some blurred lights on the left side of the track. Two blue diagonal lines are in the top-left corner, and two more are in the bottom-right corner.

Questions?

ETCS2



Develops
Facilitates
Brings together

