# ERTMS DEPLOYMENT. EVOLUTION AND CHALLENGES

**Czech Republic –Spain Railways Business Forum**

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# ERTMS RENFE FLEET. Overview

- ETCS L1 and L2 in service in:
  - All vehicles running in High Speed Network
  - Some Commuters and Medium Distance Trains
  - Some Freigth locomotives
- GSM-R voice in service in:
  - All vehicles running in High Speed Network
  - Some Commuters and Medium Distance Trains
  - Some Passenger and Freigth locomotives

- **REQUIREMENTS**
  - Technical specifications: B2 or B3 depending on each project calendar and products availability
  - Level 0, 1 and 2
  - Interface with national Class B system ASFA:
    - STM ASFA
    - National Function: Level 0+ASFA
  - **ALL TRAINS RUNNING IN ALL LINES**

**ETCS IN OPERATION SINCE 2.006**

**EXPERIENCE WITH ALL SUPPLIERS IN THE MARKET**

# ERTMS RENFE FLEET. Current situation

| Currently in operation Nº vehicles | Pre-B2 (2.2.2) | B2 (2.3.0.d) | B3 MR1 (3.4.0) | B3 MR2 (3.6.0) | TOTAL |
|---|---|---|---|---|---|
| In service | 36 | 265 | 20 | 59 | 380 |

| On going projects Nº vehicles | Pre-B2 (2.2.2) | B2 (2.3.0.d) | B3 MR1 (3.4.0) | B3 MR2 (3.6.0) | TOTAL |
|---|---|---|---|---|---|
| Upgrading Pre-B2 | | | | 36 | 36 |
| Retrofitting existing vehicles | | | | 419 | 419 |
| New vehicles | | | 13 | 393 | 406 |

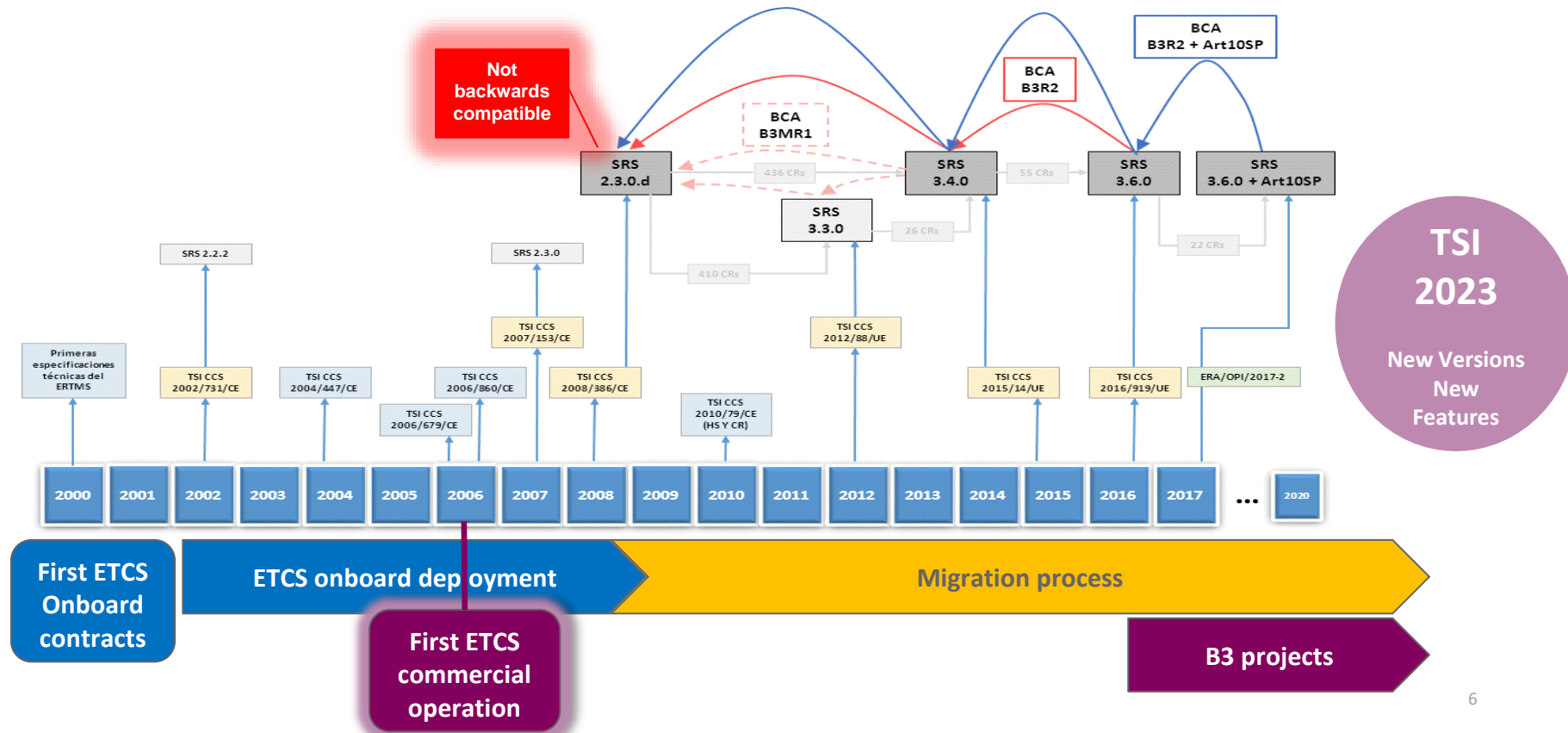| TOTAL | 1.205 vehicles More tan 30 types |
|---|---|

# ERTMS RENFE FLEET. Ongoing projects



- ETCS upgrading to B3

- ETCS retrofitting

- GSM-R voice retrofitting

- ETCS Upgrading due to error correction, reliability improvement

- ERTMS in new vehicles: ETCS and GSM-R from design

**NEXT STEPS: MIGRATION TO FRMCS, NEW ETCS VERSIONS, NEW FEATURES**

# SYSTEM EVOLUTION

# DEPLOYMENT CHALLENGES

- Frontrunners in a complex scenario:

  - ❖ Technical Specifications evolution
  - ❖ Authorisation Procedures evolution
  - ❖ Products not mature enough or in a early developmet stage

- Subsystem diversity: All ETCS onboard and trackside subsystem suppliers, different Rolling Stock

- Evolution: Migration process due to versions evolution keeping commercial operation



Source: Adif

**OBU Suppliers:**

**ALSTOM**
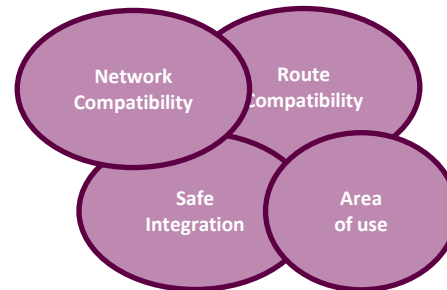**ASLTOM (BOMBARDIER)**
**CAF**
**HITACHI**
**SIEMENS**
**STADLER**

**MORE THAN 30 VEHICLE TYPES**

# ISSUES FACED



- PRODUCTS BUGS
  - Components and Functionality

- SPECIFICATION INTERPRETATION

- TRACKSIDE COMPATIBILITY
  - ESC (ETCS System Compatibity)/RSC (Radio System Compatibility)

- AUTHORISATION PROCEDURES
  - Adaptation to new regulations
  - Some concepts are not clear enough
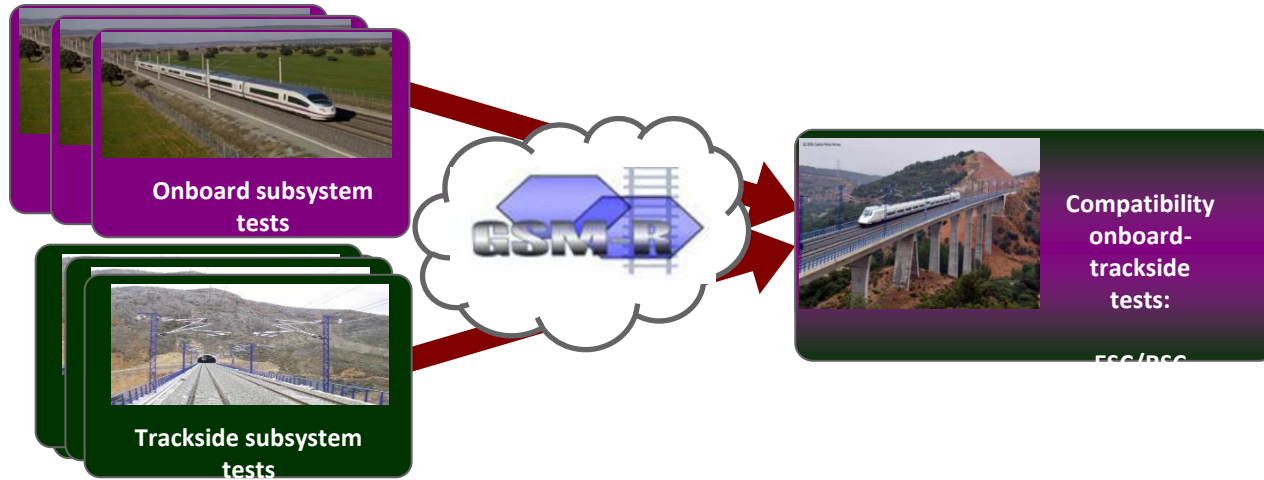
- SAFE INTEGRATION
  - Scope of each subsystem
  - Conditions of use transfered to operation/maintenance/infastructure
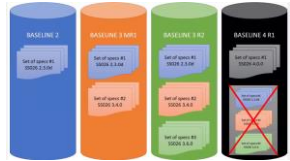


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# COMPATIBILITY TESTS



**Onboard subsystem tests**

**Trackside subsystem tests**

GSM-R

**Compatibility onboard-trackside tests:**

**ESC/RSC**

Checks required in Spain

- 🚆 28 ESC TYPES
- 🚆 3 RSC TYPES VOICE
- 🚆 3 RSC TYPES DATA

🚆 MORE THAN 30 VEHICLE TYPES

# ERTMS ROADMAP
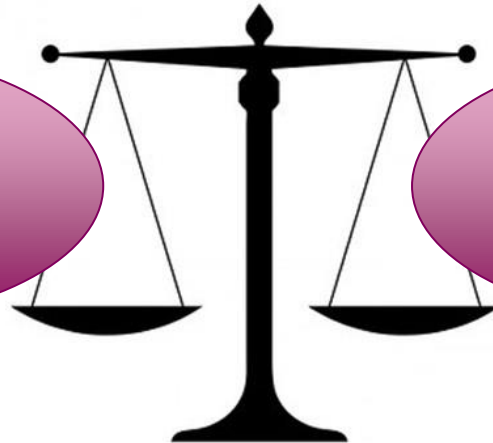


## System evolution is "a must"

New functionality
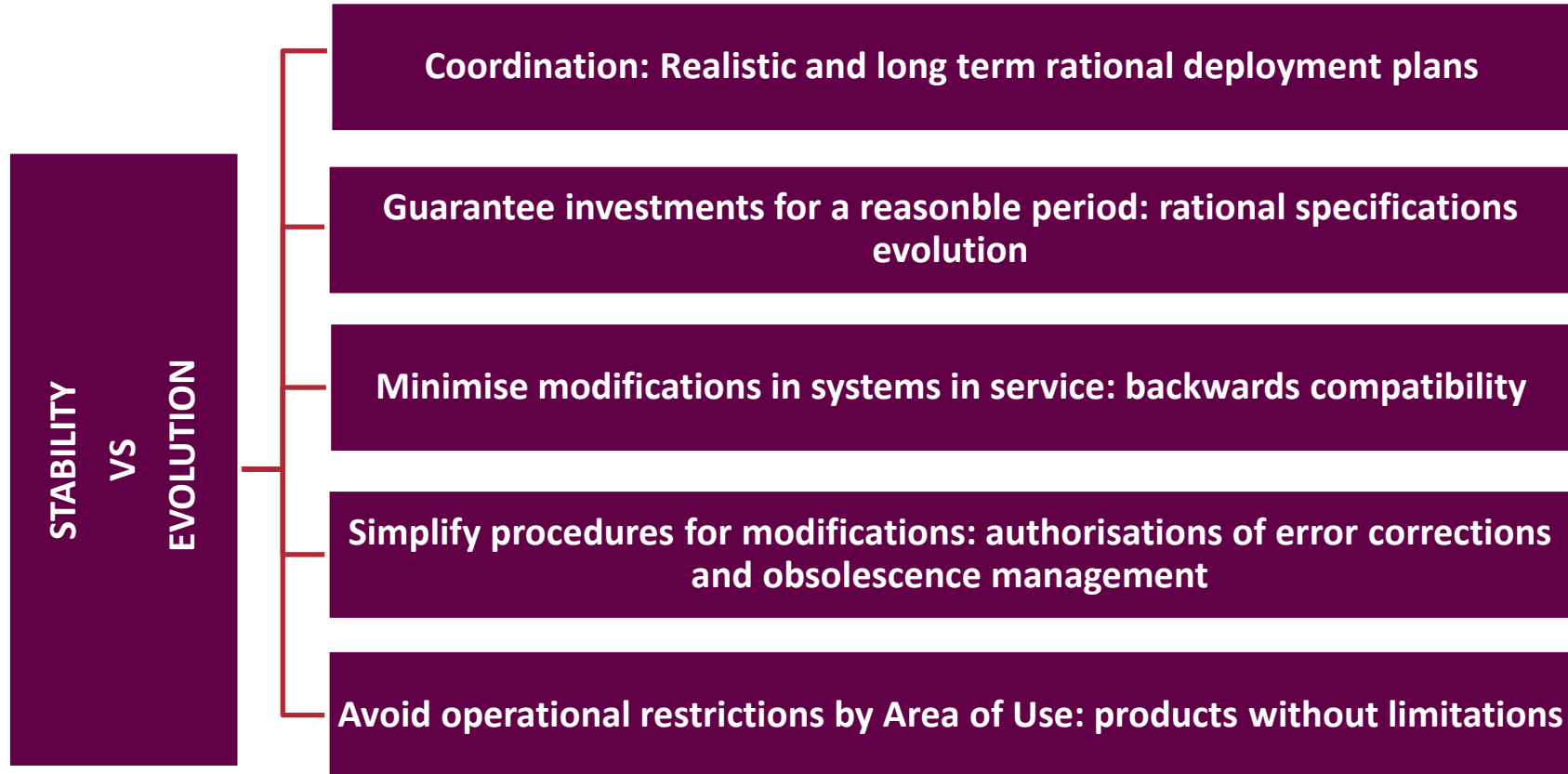Error corrections
Obsolescence
Technical evolution

Sustainable system

Impact in operation

**Evolution**

**Stability**

The way to push forward is to speed up implementation

# ERTMS Roadmap

**STABILITY VS EVOLUTION**

- **Coordination: Realistic and long term rational deployment plans**

- **Guarantee investments for a reasonble period: rational specifications evolution**

- **Minimise modifications in systems in service: backwards compatibility**

- **Simplify procedures for modifications: authorisations of error corrections and obsolescence management**

- **Avoid operational restrictions by Area of Use: products without limitations**

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