

System Version (SV) Management and Backward Compatibility Analysis (BCA)

The presentation represents a compilation taken from documents prepared by the ERTMS Users Group and ERA

Annex 2 to RFC RALP ERTMS
Deployment overview 2020

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Baseline

A **baseline**...

...is defined by a stable kernel in terms of system functionality, performance and other non-functional characteristics.

New baseline implies significant changes to the kernel by:

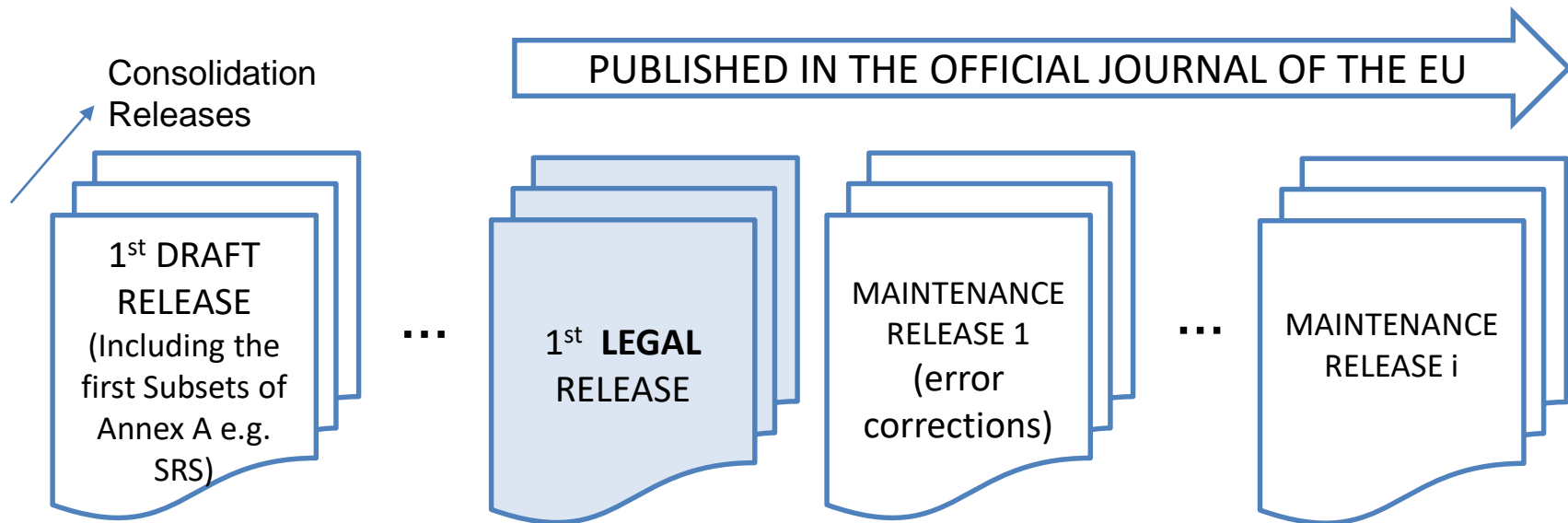
- adding new functionalities
- changing substantially existing ones

Baseline release

A baseline release...

...is defined by a specific version of the relevant documents that are listed in the TSI CCS* annex A or included in the TSI OPE* annex A.

see ERA_ERTMS_0001: ERTMS Change Control Management



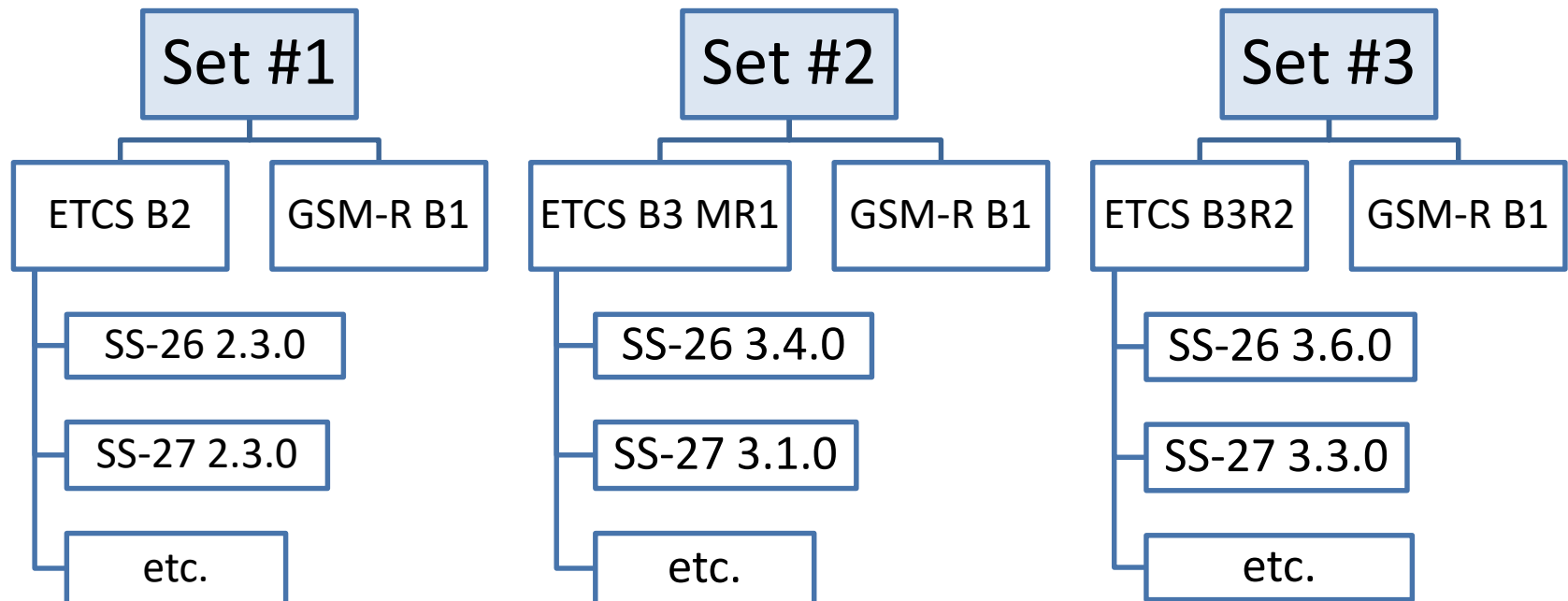
(*) Abbreviations TSI: Technical Specification for interoperability
- CCS: Control Command Signalling
- OPE: Operation and traffic management

Set of specifications

A set of specifications ...

... lists all mandatory specification documents with their version.

The TSI contains now 3 sets of which one has to be applied.



System Version

A System version (SV)...

... defines unambiguously the ETCS mandatory functions that ensure technical interoperability between ERTMS/ETCS on-board and trackside subsystems

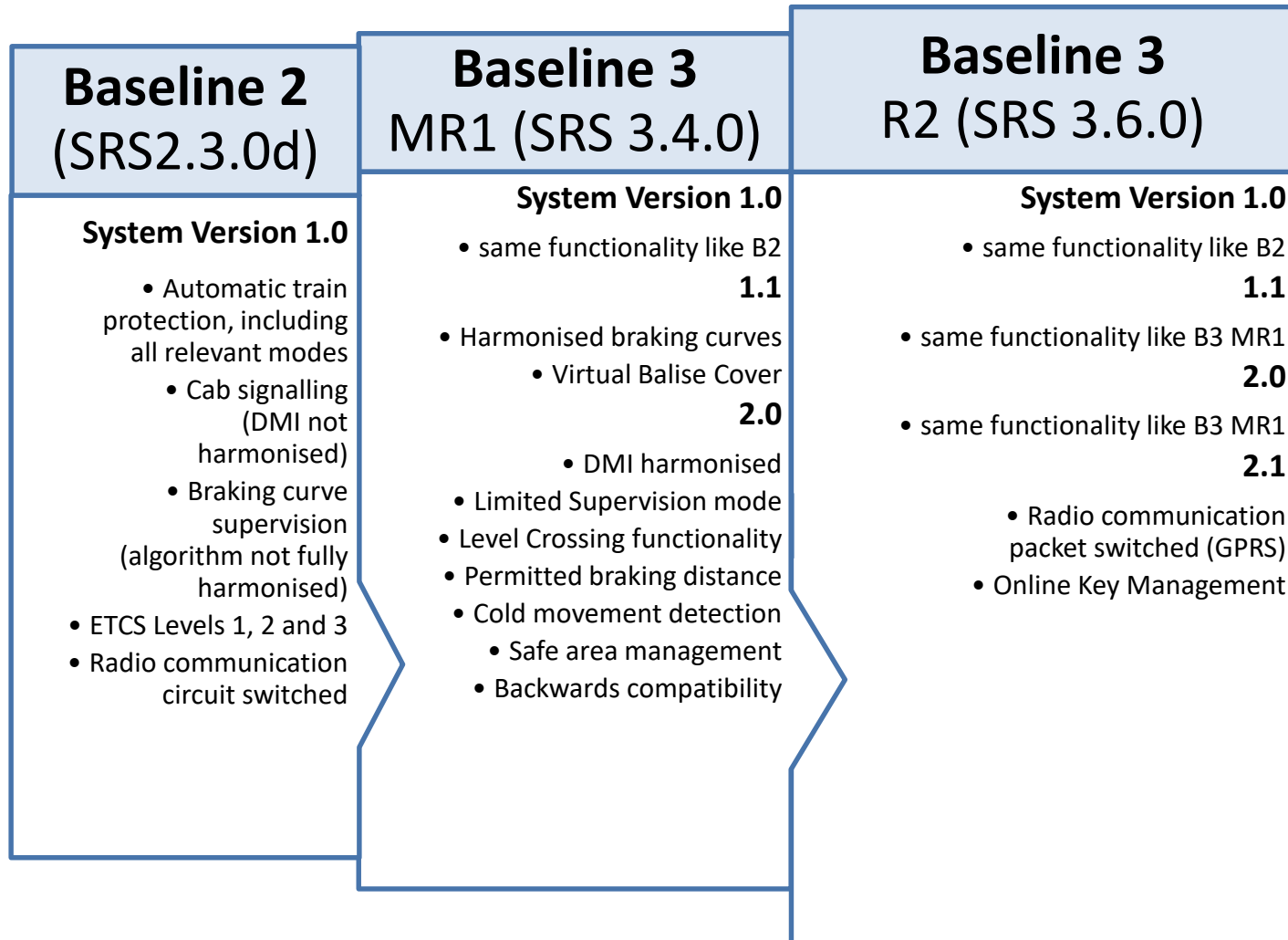
Why do we need a System version (SV)?

- To prevent situations leading to an unacceptable reduction of safety or performance, due to changes in the ERTMS/ETCS specifications (and hence behaviour)

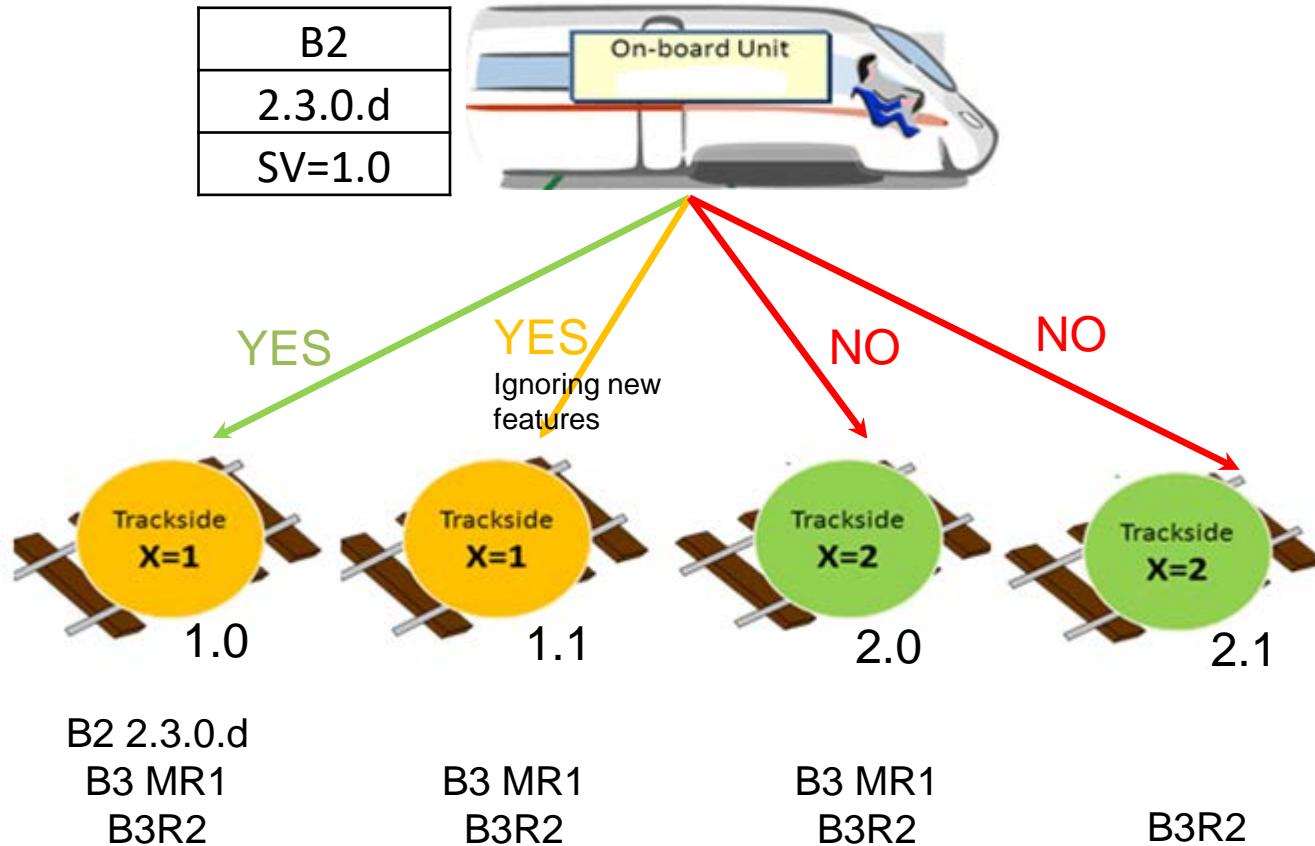
A System version (SV) is NOT:

- To be assimilated to a certain Baseline or Baseline Release
- Defined by a single document (f.e. SRS)
- A version of the ETCS language
- A suppliers' product version !

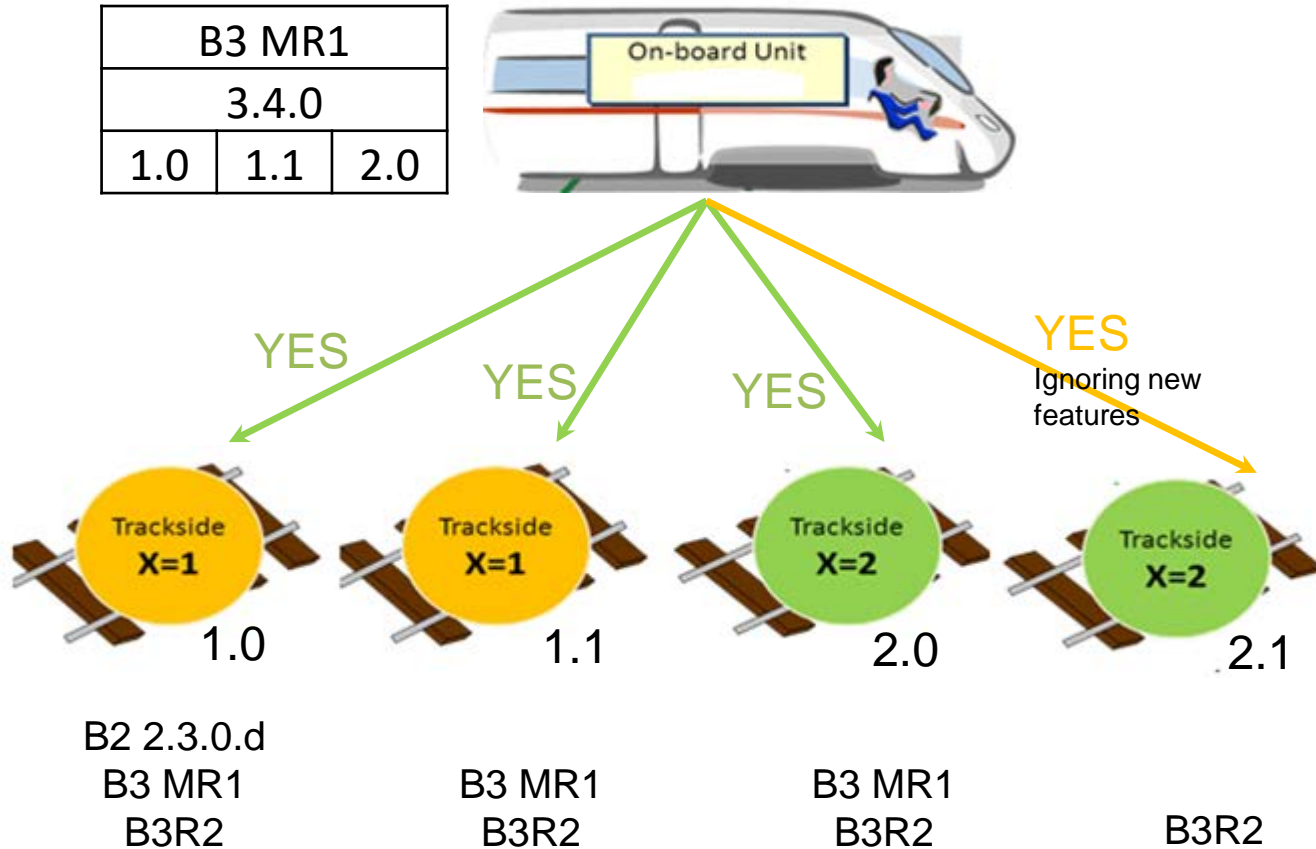
Baselines and System Versions



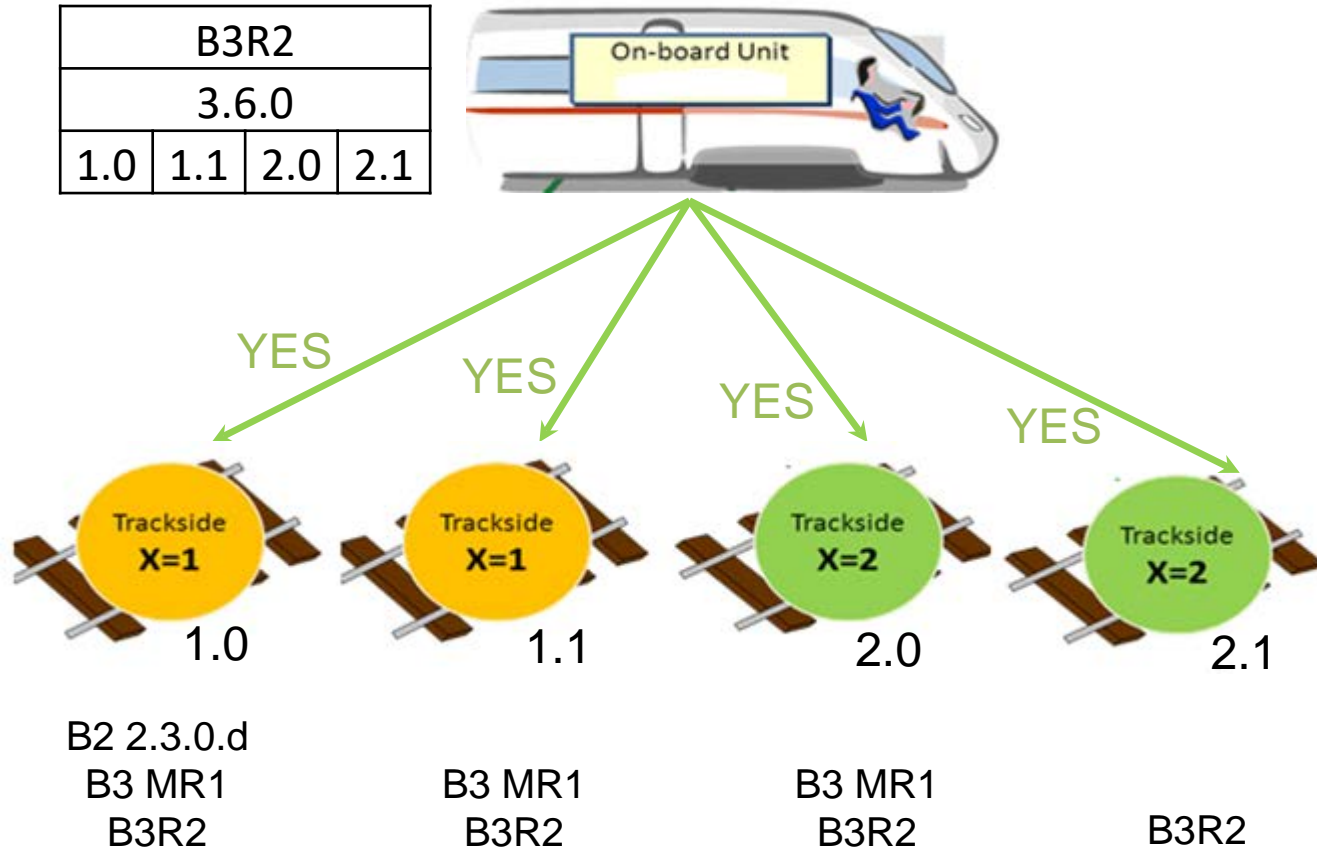
The B2 on-boards



The B3 MR1 on-boards



The B3R2 on-boards



Summary Compatibility (1)

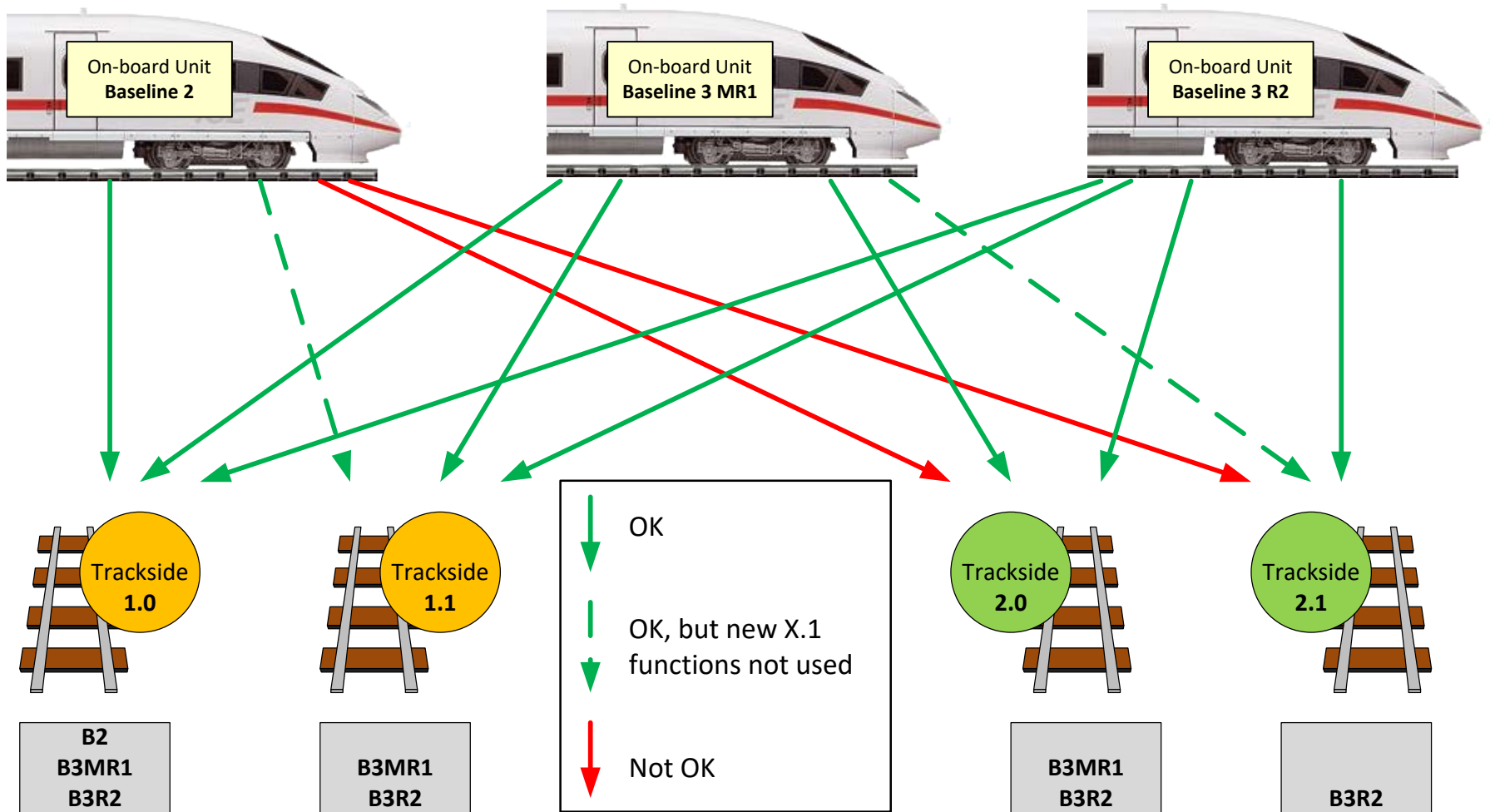
Quality, Functionality "Evolution" ↑

Quality, Functionality "Evolution" ←

		System Version	<u>Highest SV supported by on-board</u>			
			1.0	1.1	2.0	2.1
One Installed SV trackside	B2	1.0	Yes	Yes	Yes	Yes
	B3MR1	1.1	Yes*	Yes	Yes	Yes
		2.0	No	No	Yes	Yes
		2.1	No	No	Yes*	Yes

* without X.1 functionality

Summary Compatibility (2)



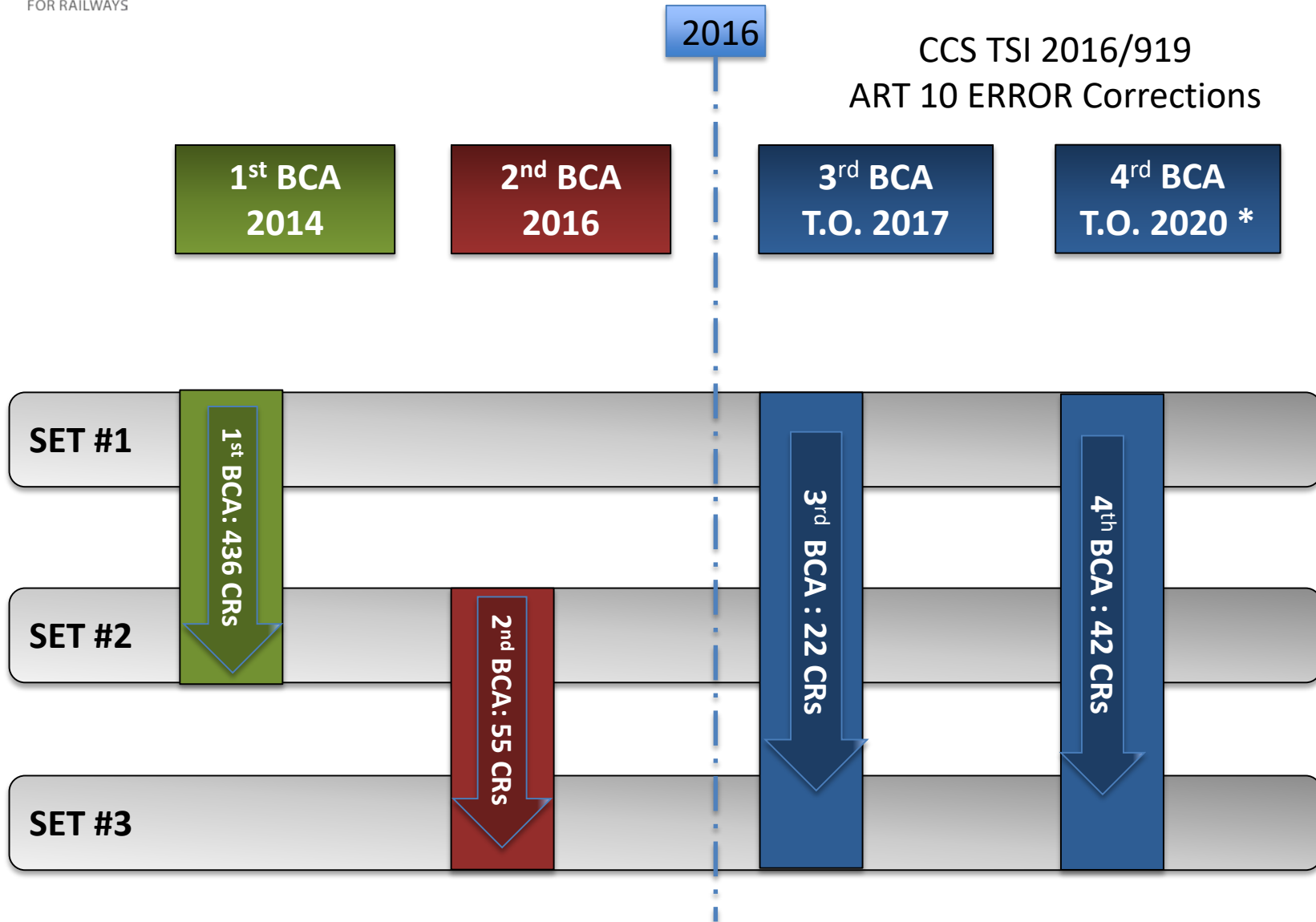
Summary

- A baseline can contain several system versions, a baseline release defines which SVs are available.
- Technical compatibility is checked between (implemented) trackside and (available) on-board system versions, NOT between baselines or SRS versions
- Trains can be backwards and forwards compatible to a trackside (however, some BCA mitigation measures should be obeyed).

Excursion on Baseline Compatibility Assessment

Baseline Compatibility Assessment

- What is a BCA ?
- BCA = **Baseline Compatibility Assessment**
- Check of compatibility between specific specification versions of ERTMS Baseline trackside and the Baseline of the on-board installed in train
- Performed on paper by specification experts



An assessment of the compatibility between baselines (BCA) has been carried out by EUG, UNISIG

How? Evaluating all changes between Baseline 2 (2.3.0d) and Baseline 3 MR1 (2014)

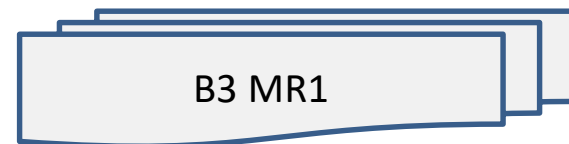
Why? 1. To verify the backwards compatibility between B3 and B2

2. To detect potential compatibility issues within B2, due to unsolved errors in the specs.

Results:

1. CRs fixing problems introduced by the B3

2. Recommendation on how to deal with errors already existing in B2 specifications.



- A second baseline compatibility assessment has checked that:
 - ETCS baseline 3 R2 is fully backward/forward compatible with ETCS baseline 3 MR1
- Was part of the Change Control Management organised by ERA
- Checking of compatibility between B3 and B2 and within B3
- For all 55 CRs of B3 R2
- Defining mitigation measures for detected problems

Since BSL3R2 : Error Correction – Art 10

- The Agency, in collaboration with the experts of the Sector organizations, is carrying out the analysis and assessment of the CR in the database that can be considered as errors in the system specifications, with a view to identify those errors which could prevent the system to provide normal service according to Article 10 of the Commission Regulation (EU) No 2016/919.
- The results of this work is presented in this Opinion [ERA/OPI/2020-2](#).
- Performed for all **new validated** error CRs
- **Mitigation** to be published regularly (Art. 10)
- **Changes** to specifications to be included in next TSI

- BCA provides help to analyse compatibility
- Art. 10 provides officially published – between legal TSI's – mitigation measures.
- Further reading :
 - ERA_ERTMS_0001 ERTMS Change Control Management
 - BCA reports