



Compliant Infrastructure

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Content

- Braking curve issues
- Compatibility assessment

15-11-2017 CCRCC 2017



Braking curves

- In the past years the railway sector has detected certain shortcomings in the ERTMS specifications on braking curves.
- This topic was identified as the "braking curve game changer" in the ERA list of game changers.
- EUG was assigned the task to investigate and describe these braking curve issues.
- The result is a list of seven individual topics where improvements are proposed to improve the business case of ETCS (e.g. suitable for high performance networks).
- This list was sent to ERA in September 2017.
- Next step is for ERA and the sector to agree on how to proceed with these topics.

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Compatibility assessment

Compliant Infrastructure =?

Compatible Infrastructure

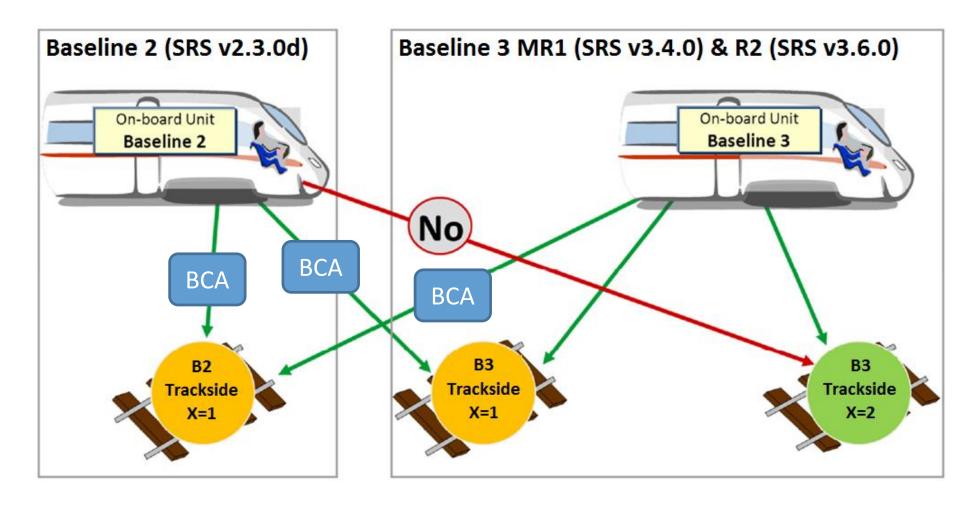


Background (1)

- With the introduction of baseline 3, MR1 and R2, a total of 491 CRs was solved.
- A Baseline Compatibility Analysis (BCA) was performed for each CR with all versions (B2, B3MR1, B3R2) and on-board and trackside both with/without the CR solution implemented.
- Out of the 491 CRs, only 59 were assessed as potentially leading to compatibility problems.
- For most of these 59 CRs, trackside mitigation measures were defined.



Background (2)



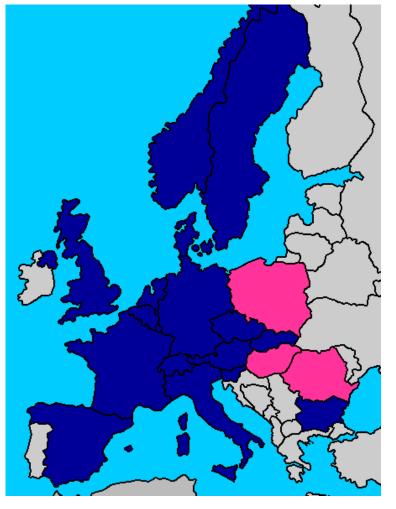


Support to the BCA validation

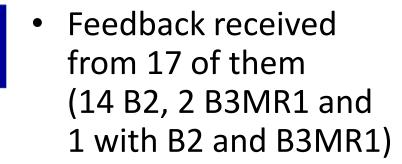
- EU funded project performed by EUG and INECO from September 2015 until end 2017.
- Original scope: Support the validation of the BCA by investigating the practical impact of BCA on existing B2 compliant infrastructure in Europe.
- Note that the analysis of the BCA is made by the Infra Managers themselves. The EU project only provided support and investigated the results.
- Scope was extended with B3 (MR1) infrastructure.
- Errors, which were recently solved in the context of the ERA Technical Opinion, are out of scope (too late for the time frame of this project).



Overview



 A total of 20 Infra Managers has been addressed



 No feedback received from 3 of them

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Work methodology (I)

- <u>1st step:</u> Recollection of all the necessary information to validate the BCA report
 - Deep knowledge of some CRs is required to assess the potential compatibility issues identified in the BCA reports.
 - Use of tailored questionnaires to recollect the information.
- 2nd step: Identify the specific CR with theoretical possible impact in a specific network
 - Classification into 6 categories of impact of the 59 CRs identified in the BCA reports for each network based on the information provided by IMs.



Work methodology (II)

Assessed networks

Categories A-D: Issues
without impact (i.e. function
not used, BCA mitigation measure
implemented, other mitigation
measure implemented or impact
not relevant for IM although
function is used and not mitigated)

Category E: Theoretical possible impact only for B2 on-boards

Category F: Theoretical possible impact for B3 on-board

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0156	Use of NID_OPERATIONAL	E	E	8	8	8	8	A	E	E	- 8 -	A	- 8	E	8				
0345	Test message in SH, SN mode	8	B	8	F		9	8	8	8				8	8				П
0410	Shunting in STM areas	A	A		F.	A		- 4	A	C	A	A	F	. 0	Α _			=	г
0437	Use of N_ITER	9	R	- 8	В	- 8	- 2	1	E	8	- 8	- 8	8	8	- 8				т
0484	Clarification required: Made profile and Infill	100	100	2.5	- 2	100	200		2000				200	20/20	- 31		_		т
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0650	Tie in movement in L158 without Train Data	A	A	A	A	A	A	A	A	E	A	A	A	A.	A	T			411
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0671	Inconsistency of Requests Parameter	- 8	B	8	8	8	3	A		R	-	A	8	R	9 _	_	_	-	+
0710	Clarify if received but not yet applicable								- 1							_	_		-
0110	National Values shall be deleted in NP	8	C	.0	F:	8		(3)	8	0		8	c		8	•			411
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0712	Confusion in packets not transmitted by infill	A	A	A.	A	Α.		- 4	- 6	D	A	Α	A	A.	Α.		- 1		411
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0800	Conditional level transition order overrides							- 10			_	- 3							r.
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	section 4.8.3 of the SRS						100		10000	100				1000					ш
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	Data when received in RV mode	200		100		222			17757	- 3			350	1000	- 22				1
0997	End Section / Overlap Timer	A	- 1	A	A	8	A	A	A	A	A	A				to the second			ſ
0899	Replacement of track description and linking		4	- 0			-	- 2	-				-		8				г
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0907	Hazardous brake command in RV	Α	A	A.	A		A	F	A	F	A	Α	A	0.	A		_		t
0914	Missing repeat condition	A	A	A	A	A	A	A	A	A	A	A	A	A	A				Ħ
0917	Display of permitted speed in RV	-	-	-	-		-	-	A	-	-			0	A		_		٠
0917	Rejection of List of be Isses for SH area, error	- 6	A		A		-	-		-	- ^	- 8	- 0		- 20				٠
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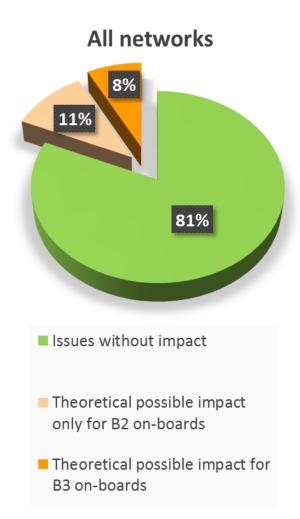
Work methodology (III)

- 3rd step: Assessment of the possible impact
 - CRs in Category E and F are assessed to identify the possible impacts and when they are applicable in a specific network.
 - These possible impacts are only applicable for specific on-board product implementation, i.e. depending on the on-board behaviour the impact could be relevant or not.
 - Some infra managers have reported that most of these behaviours have not been detected in current on-board subsystems products.



Results

- The BCA reports identified 59 CRs to be analysed for B2 lines.
- The BCA reports are also relevant for B3 MR1 lines.
- 5 CRs solved from B3MR1 to B3 R2 should be analysed for B3 MR1 lines to assure that B3MR1 and B3 R2 on-boards can run a normal service.
- 92 % of the potential compatibility issues have no impact for B3 on-boards on the lines which were investigated.
- 48 % of the potential compatibility issues are related to functionalities not used.
- 24 % of the potential compatibility issues have been mitigated by implementing the mitigation measure proposed in the BCA reports and only 5% by implementing another mitigation measure.





Conclusions

- With feedback from 17 IMs the BCA validation has been well performed.
- The BCA reports were useful for IMs to assess compatibility issues on their lines.
- Especially for B3 on-boards there are very few CRs which have to be checked when a new train comes to a certain line.
- BCA is still useful to assess the impact of any error in the specifications which might be detected in future.





Thank you for your attention

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