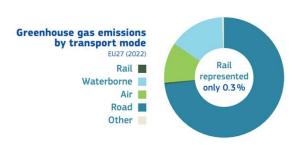






# Rail is special...



Source: RMMS Report, European Commission, 2025

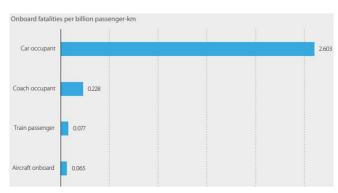


Energy consumption/CO<sub>2</sub> 5 – 10 x lower

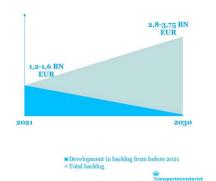


Safe

Passengers 40 x more safe than on the road



Source: Report on Railway Safety and Interoperability in the EU, ERA, 2024







Vulnerable Infrastructure

Cyber Attacks, Natural Disasters



www.spiegel.de





### ...but should not aim to be fine art

- 1. Unique concepts
- 2. Custom-made for pretentious clients
- 3. Originals only, replicas are not tolerated
- 4. Prices are huge and increase with time
- 5. Locked in small private collections or in museums















## Unlike fine art, rail is a masterpiece when:

- 1. It is based on **standardization**
- 2. It follows an industrial approach, with economies of scale
- 3. It crosses borders seamlessly as a true EU solution
- 4. It is **affordable and safe** for the wide public
- 5. It follows an integrated deployment and financing plan



# Non-interoperability - I

### Investment costs

Multiple incompatible systems and equipment for RUs & IMs
Needs for continuous upgrades and compatibility testing

## Maintenance costs

Duplicated systems exposed to obsolescence

### Sunk costs

Low or no resale value of assets due to customization

### Operational costs

Inefficient operations with time losses at borders, hig TAC, inefficient ticketing, low availability of train paths, terminals or maintenance workshops

### costs

Small markets for customized products, no critical mass, low profitability to afford costly innovations

Innovation

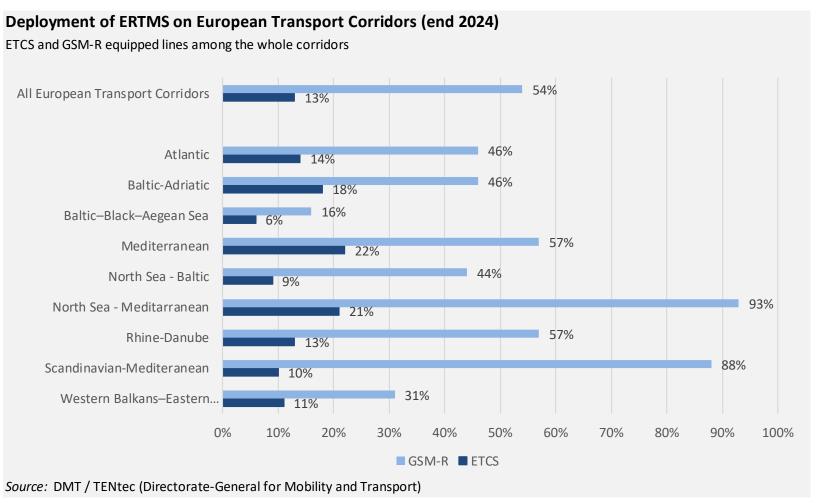
Low penetration in new markets, low attractiveness of rail mode due to high cost and slow travel time

Opportunity

costs



### Non-interoperability - II



# 7

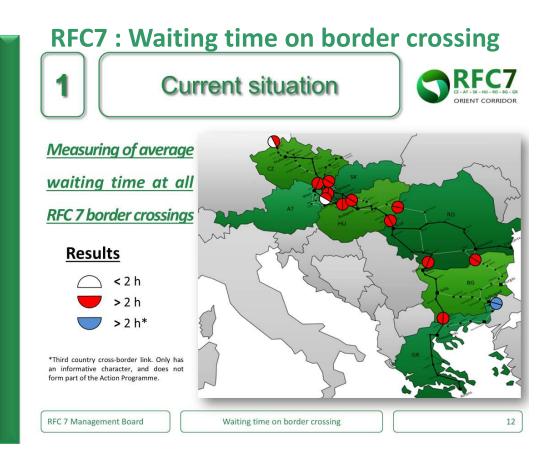


#### **Border Crossing Dwelling Time Report**



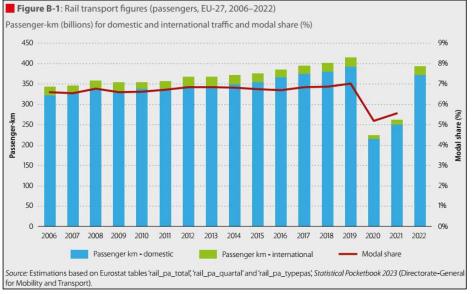
					Time													Average Schedule time week 38 2019	Week 38 Average Real Time week 38 2019
RU	North/South	Maximum tim																23/22 minutes DB Cargo, schelduled time, arrived/departure Shunting time,	All trains left ahead the schedule (30'earlier)
DB Cargo	Process time	from arriaval to (can be parallel) in minutes	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140		
	Malmö	Change Loco																	
		Wagon Shunting (e.g. buffer wagon)																	
		Technical check (with or without ATTI)			*														
		Brake test				1	1	3	3	3			di ili	- 6	- 6	. 8	- 5		
		Administration (paper train orders)																	
		Train ready message/route control																	
			Durat	ion of	proced	ure: 23	minute	es											
		P	roce	ess	Time	9												Schedule time week 38 2019	
RU	North/South	Maximum time	e tha	t trai	ns ne	ed to								_				week 38 2019 28 min.	Real Time wee 38 2019 9 min. Gained*
RU	North/South Process time	Maximum time from arriaval to (can be parallel) in minutes					arra 40	nge t	heir l	oorde 70	er pro	ocedu 90		110	120	130	140	week 38 2019	38 2019 9 min. Gained*
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RU DB Cargo	Process time	Maximum tim from arriaval to (can be parallel) in minutes Change Loco Wagon Shunting (e.g. buffer wagon) Technical check (with or without ATTI)	e tha	t trai	ns ne	ed to								110	120	130	140	week 38 2019 28 mm. only DB Cargo trains with one trainnumber are counted - train number changes	38 2019 9 min. Gained* only DB Cargo trains with one trainnumber are counted - train
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DB Cargo RU Rail Cargo	Process time  Padborg  North/South  Process time	Maximum tim from arriaval to (can be parallel) in minutes Change Loco Wagon Shurling (e.g. buffer wagon) Tachrical check (with or without ATTI) Brake test Administration (paper train orders) Train ready message/route control  Maximum tim from arriaval to (can be parallel) in minutes Change Loco Wagon Shurling (e.g. buffer wagon) Tachrical check (with or without ATTI)	Durat	it trai	Time	ed to	40 min	50	60	70 Dorde	80	90 ocedu	100					week 38 2019 Z8 THT. only DB Cargo trains with one trainnumber are counted - train number changes are not considered and there isen't many trains running  Average Schedule time week 38 2019  AVAMS (only) Tains with one	38 2019 9 mm. Gained* only DB Cargo trains with one trainnumber an counted - train number change are not considered an there isen't mai  Week 38 Average Real Time wee 38 2019 13 Minutes Source ÖBB ARAM'S (only trains with one

# Non-interoperability - III





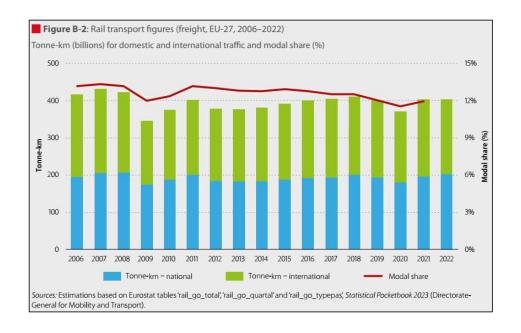




Interoperability barriers are among the top reasons for the low competitiveness of rail (Costs of non-interoperability-2023 - Briefing note-final.pdf (europa.eu))

## Non-interoperability - IV

The modal share of rail transport in Europe is stagnating around quite low levels (around 6 % for passenger and 12 % for freight respectively)







# Some ideas on how to make progress, while guarding safety

### 1. Think time, money and knowledge

- Mature technical specifications
- Strike the right balance between innovating and protecting existing investments; well thought deployment plans
- Standardised solutions and harmonization at engineering rules level; leave no room for "original" solutions
- Leave no room for system compatibility testing
- Plan production capacity and ensure predictability on orders
- Streamline administrative processes for authorization
- Mainstream TSIs and ERTMS savviness to the "large masses"

### 2. Think cross-border

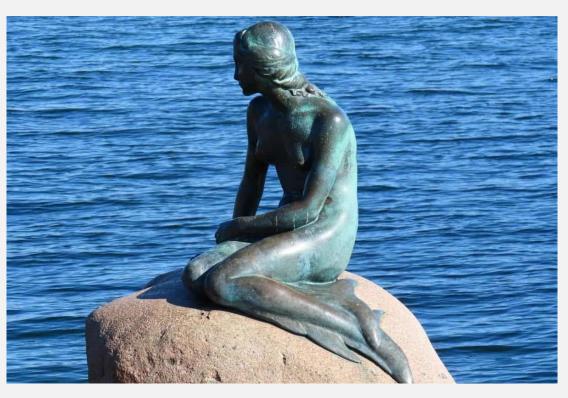
- Where and why do bottlenecks persist; where does it hurt most (follow the high traffic volumes first); further clean up of operational rules
- Native cross-border solutions vs "cleaning work" after
- Talking and listening to the "neighbors" as early as possible
- ERTMS-native investments with fast decommissioning of the legacy systems; large cross-border projects and their positive domino effect

Non-interoperable, non-standardized rail projects have no chance to become as famous as fine art...





# Bronze plain colour with blue sea background is actually great...



# THANK YOU

Moving Europe towards a sustainable and safe railway system without frontiers.

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