



Mixing mainline and urban systems

how to combine system and subsystem approaches
for safety demonstration

Synopsis

1. Urban systems vs mainline systems
2. Mixed systems : definition and issues
3. Interlinking subsystem and common vehicle application file
4. Building the new rules with all the stakeholders

Mainline vs Urban

- What are we talking about ?



Mainline

Urban

Mainline vs Urban

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Mainline

Urban

Mainline vs Urban

Mainline

- Conventional railways
- High speed railways
- Interoperable
- Sub-system approach
- EPSF (French rail safety authority)

Urban

- Tramways
- Métros
- Not interoperable
- System approach
- STRMTG (French ropeways and urban guided transport department)

Mainline vs Urban

Mainline

- Mainline systems have to accommodate passengers and freight
- They are interoperable in order to offer longer journeys and an open access to the market. It's an European network !
- The EU sets mandatory technical specifications for interoperability (TSIs) to achieve this goal
- So safety demonstration is performed through a sub-system approach with several authorisations for one system (at least two : vehicle and fixed installations)

Mainline vs Urban

Mainline

- The allocation process with a subsystem approach has to be done within each subsystem :



Energy

Rolling stock

On-board control-command and signalling

Trackside control-command and signalling

Infrastructure

1 authorization / subsystem

Mainline vs Urban

Mainline

- EPSF :

- French railway safety authority ;
- Subsystem approach ;
- Mainline network :
 - ✓ 30 000 km ;
 - ✓ 37 railway undertakings ;
 - ✓ 16 infrastructure managers (including harbours) ;
 - ✓ 110 000 registered vehicles in the national register ;
- Passagers :
 - ✓ 80 billion passenger-km annually approximatively ;
- Freight :
 - ✓ 30 billion ton-kilometer annually approximatively.



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Mainline vs Urban

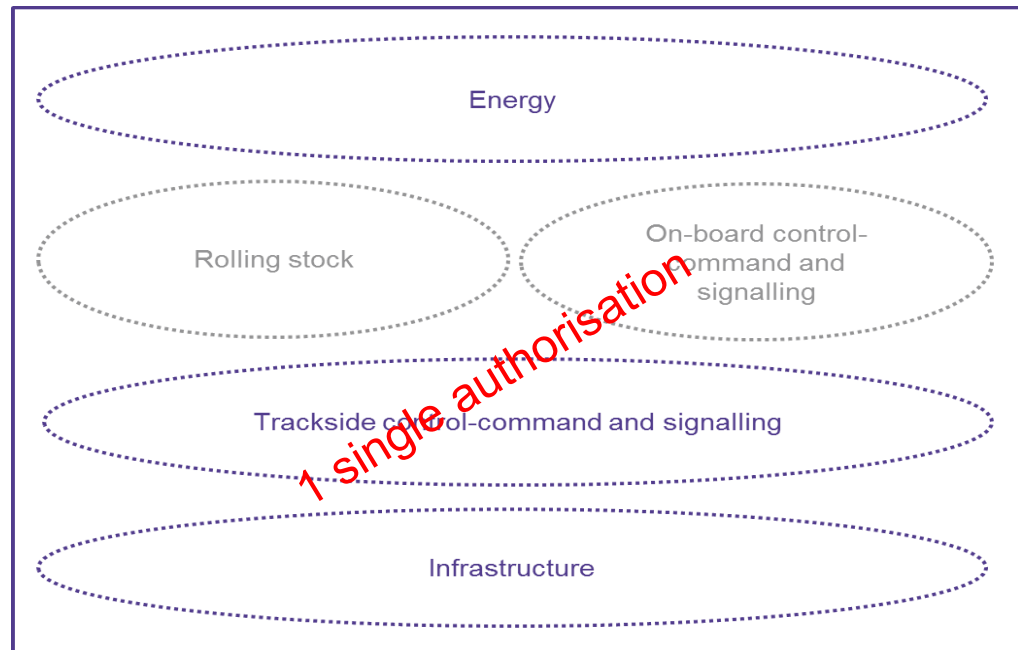
Urban

- Urban systems have to meet specific requirements due to their environment and level of service
- Tramways have to deal with pedestrians and motor vehicle interactions
- Metros have to offer a high level of service and have a specific gauge as they are running most of the time in tunnels
- There aren't many mandatory technical specifications
- So safety demonstration is performed through a system approach with a single authorisation for one system

Mainline vs Urban

Urban

- The allocation process with a system approach may be done within the whole system :



Mainline vs Urban

Urban

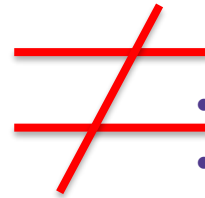
- STRMTG :
 - Cableways and guided transport systems safety ;
 - System approach ;
 - Tramways :
 - ✓ 74 lines in France ;
 - ✓ 1 billion people transported annually approximatively ;
 - Metros :
 - ✓ 30 lines in France ;
 - ✓ 2 billion people transported annually approximatively ;
 - ISO 9001 Certified.



Mainline vs Urban

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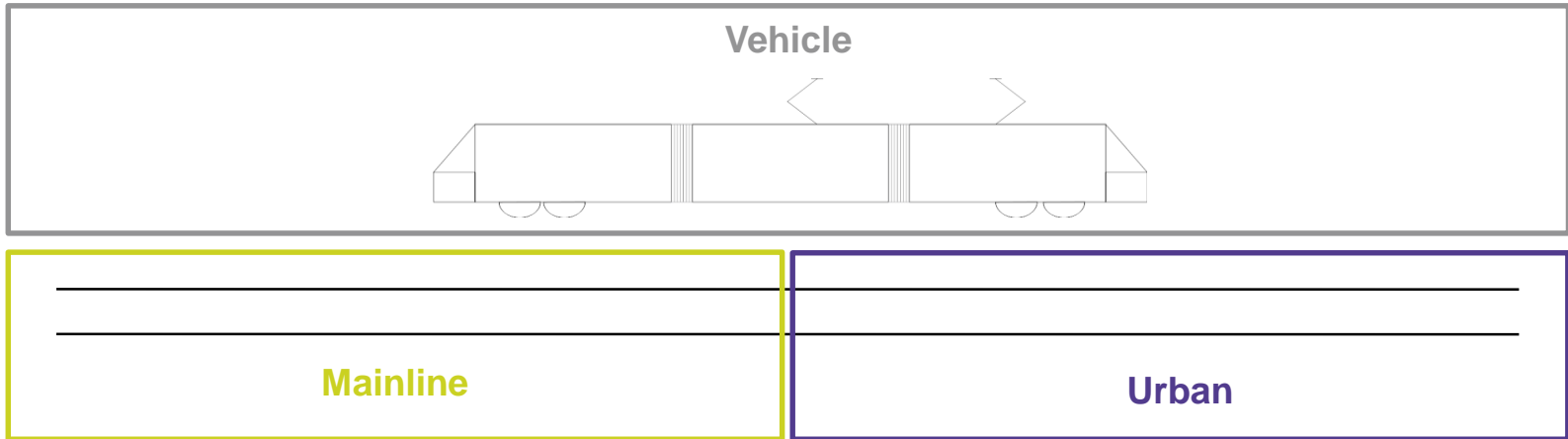


Urban

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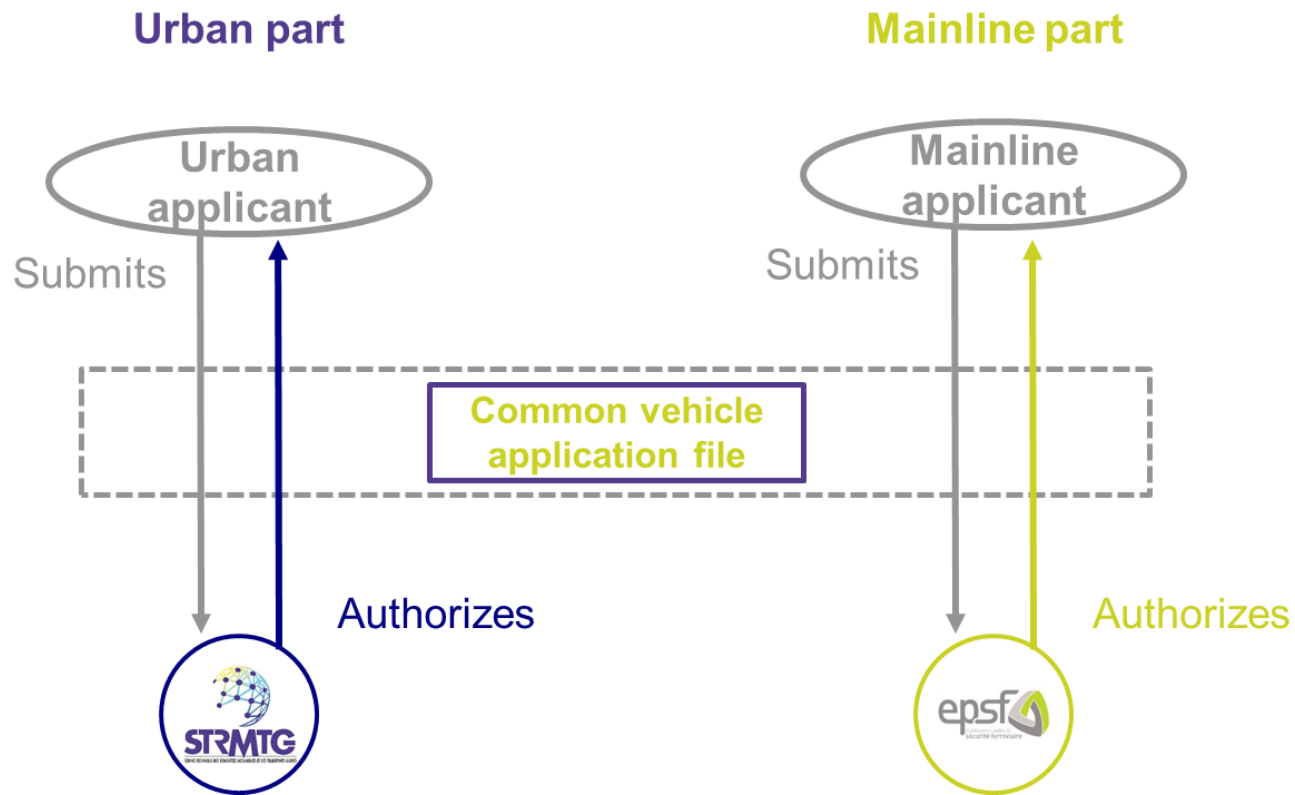
What happen when we have to mix these two different systems ?

Mixed systems



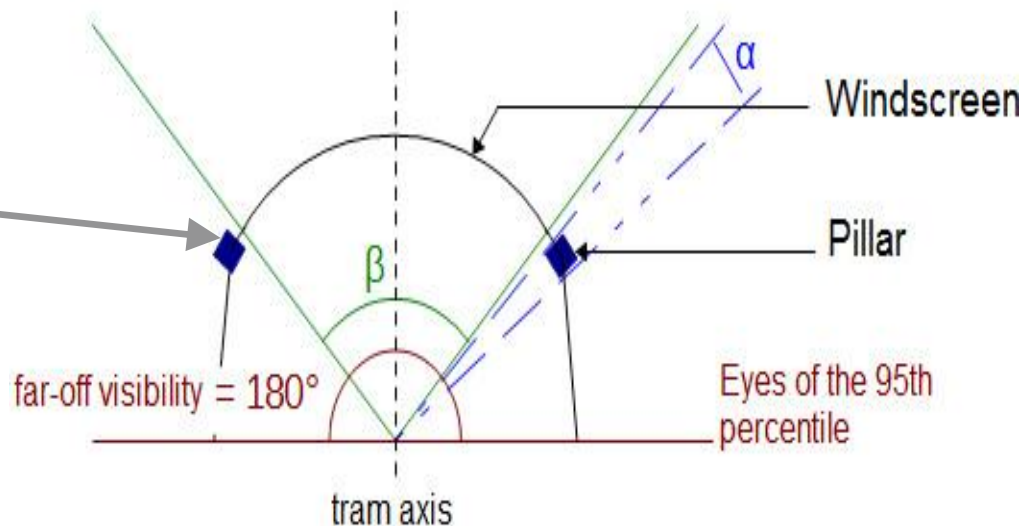
- Specific issue regarding the vehicle :
 - It will be authorized twice, for the urban part and for the mainline part ;
 - Opposite requirements may occur
- Specific issue regarding the interfaces :
 - Some risks with consequences on the urban part may be mitigated by measures on the mainline part ;
 - And vice-versa.

Common vehicle application file (1/2)

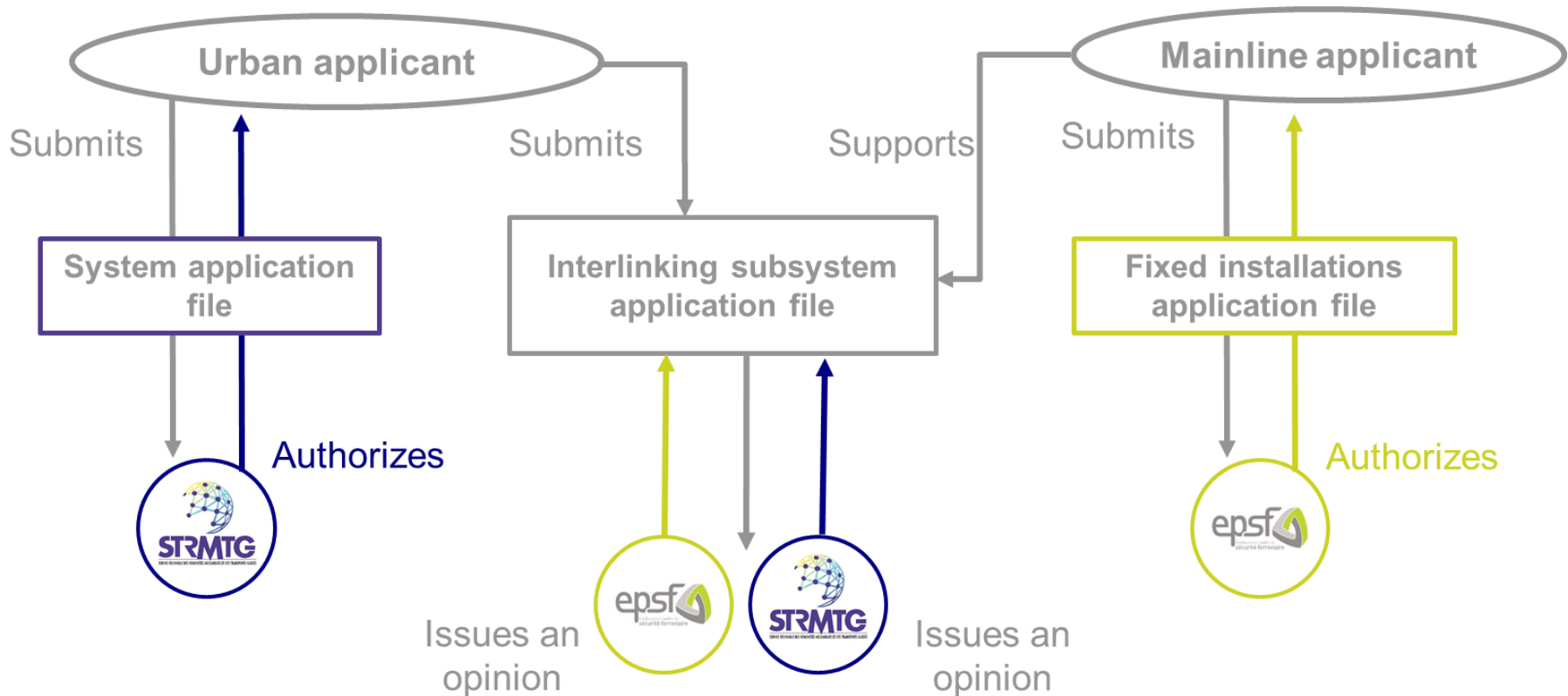


Common vehicle application file (2/2)

- Example :
 - Light rail vehicle (French tram-train)
 - Mainline - the driving cab will have to be designed to meet high crashworthiness targets
 - Urban – the driving cab will have to offer an adequate outside visibility



Interlinking subsystem (1/2)

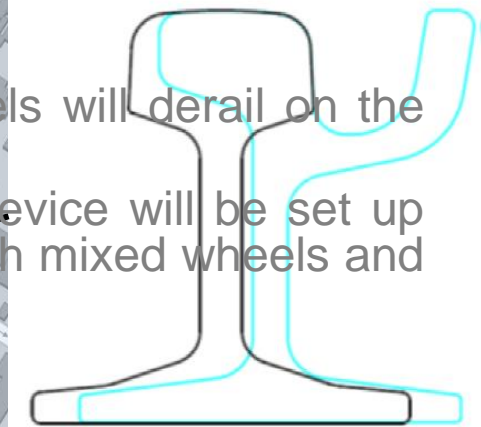


Interlinking subsystem (2/2)

- Example :
 - Tram-train system :




- ✓ Standard rails on the mainline part ;
- ✓ Grooved rails on the urban part ;
- Risk : a train equipped with standard wheels will derail on the urban part ;
- Mitigating measure : a specific signalling device will be set up on the mainline part to identify tram-train with mixed wheels and allow them to come in the urban part.



Signalling device

Building the new rules

- A regulatory body based on three texts :
 - Decree n°2017-440
 - An implementing act (« Arrêté du 30 mars 2017 »)
 - A non-mandatory guide
- Involving the sector :
 - At the early stages
 - Working group coordinated by EPSF and STRMTG
 - With representatives involved in the authorization process
- Designing details :
 - Within the same timeframe of the general principles
 - To make sure they are applicable and efficient.



More detailed

Summary

- Two different ways of assessing safety but a same goal : do not decrease the level of safety
- Vehicle : from 2 safety files to 1 only, allowing common assessment
- Infrastructure : 2 separated files but 1 shared analysis on interfaces, in order to deal with risks induced by the « border change »
- Outlook : to precise regulation to be compliant with the new EU rules coming into force in june 2019

Coming soon in English



Procédures d'autorisation des systèmes mixtes



Thank you for your attention