Vehicle authorisation
The case of REGIO2N
Introduction

Budapest, 28th June 2017

EUROPEAN
UNION
AGENCY
FOR RAILWAYS

EUROPEAN UNION AGENCY FOR RAILWAYS

What are we talking about?

- Authorisation of placing into service

"The authorisation for placing in service of a subsystem is the recognition by the Member State that the applicant for this subsystem has demonstrated that it meets, in its design operating state, all the essential requirements of (Interoperability) Directive 2008/57/EC when integrated into the rail system"

- Electrical Multiple Units
- Regional lines
- Operated in France

EUROPEAN UNION AGENCY FOR RAILWAYS

Who will present the topic?

BOMBARDIER

belgorail

SNCF

CERTIFER

epsf
établissement public de
sécurité ferroviaire

EUROPEAN UNION AGENCY FOR RAILWAYS

What roles do they play?

NATIONAL SAFETY AUTHORITY

Railway Undertaking

Manufacturer

INFRASTRUCTURE MANAGER

Notified Body

Designated Body

Independent Safety Assessor

Applicant

Agenda of the session

- Presentation of the REGIO 2N project
- Presentation of the actors and their roles
- The story of the project:
  - Pre-engagement and regulatory framework
  - Requirements capture and definition of types
  - Design, production, assessment of conformity
  - Compiling the files, assessment and authorisation
- After the authorisation
- Conclusion

Agenda of the session

- Presentation of the REGIO 2N project
  - 2 presentations:
    - SNCF
    - Bombardier

INTEROPERABILITY AND SAFETY ASPECT

TRAINING WITH REGIO2N TRAIN

DIRECTION GENERALE TER - F. HERINGER
 – JUNE 28, 2017

REGIO2N PROJECT FOR PASSENGERS

+ THE BACKGROUND OF THE PROJECT
+ THE NEED FOR A CUSTOMIZED FAMILY OF TRAIN
+ THE MOST SIGNIFICANT CHARACTERISTIC OF THE TRAIN

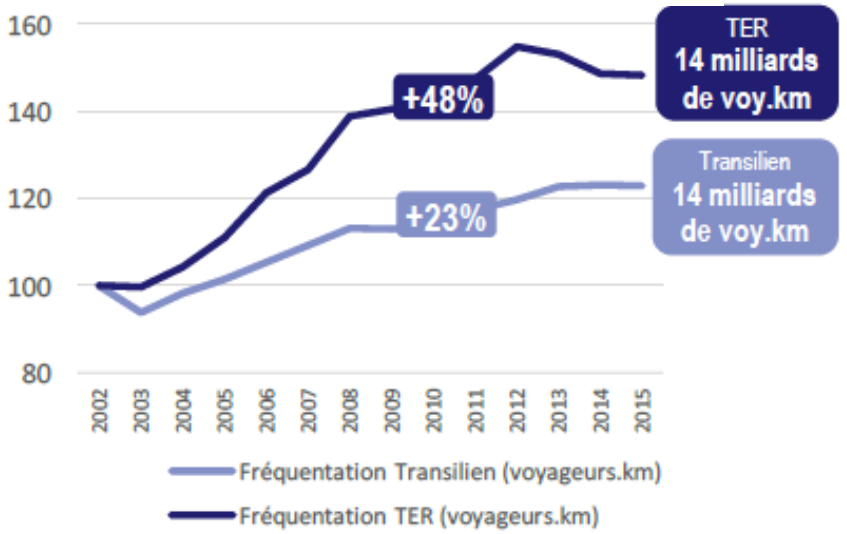
BACKGROUND OF THE PROJECT

THE INCREASE OF THE REGIONAL TRAFFIC

Since 2002, French regional administration organize regional transport of passengers

+ 80% of rolling stock has been renew through 11 billion euros investment
+ 48% increase of the regional traffic
  - ➔ 7500 Trains/day
  - ➔ 900 000 passengers/day
+ 23% increase of PARIS train traffic
  - ➔ 5200 Trains/day
  - ➔ 3,2 millions passengers/day

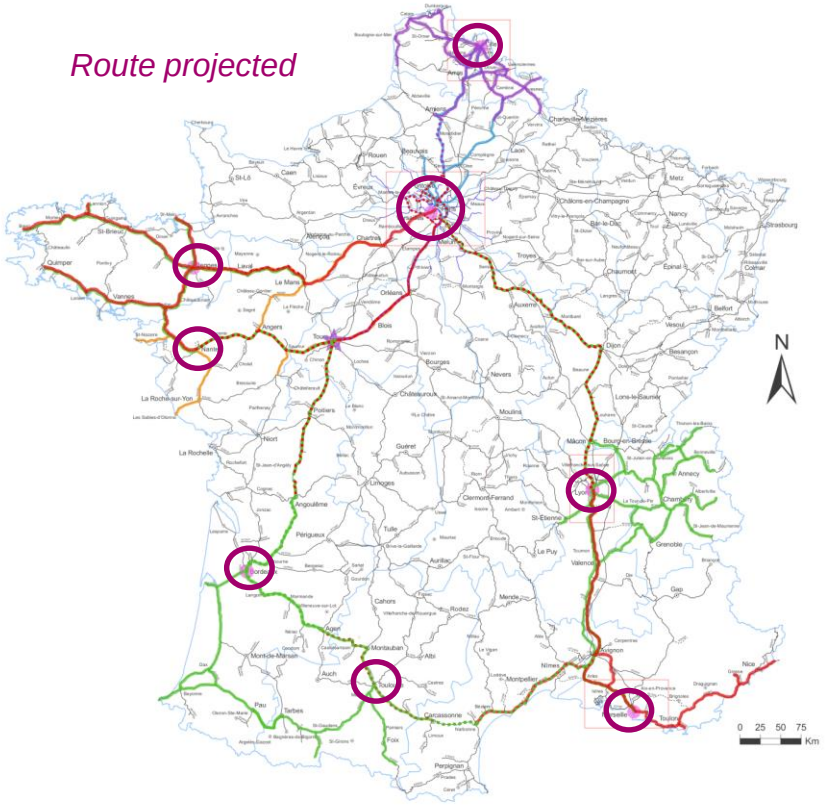
Passengers evolution in regional trains



THE NEED OF A CUSTOMIZED FAMILY OF TRAIN

Considering the increase of the traffic, it was necessary to get a train :

+ Presenting a big capacity of seat in a short length
+ Able to accept passengers on the train platforms and the aisle
+ Able to be connect together (multiple unit) to give various capacity of passengers
+ Commuter train with 2 floors and comfort for passengers
+ With disabled access (for platform at 550mm)
+ Able to run at 160 km/h even at 200 km/h



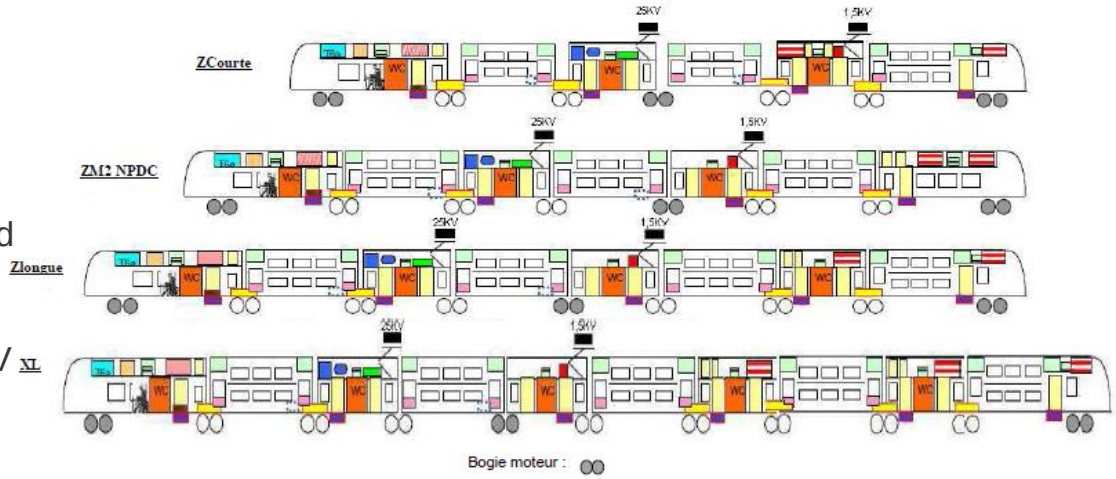
Big towns needed capacity train

JUNE 28, 2017

MOST SIGNIFICANT CHARACTERISTIC

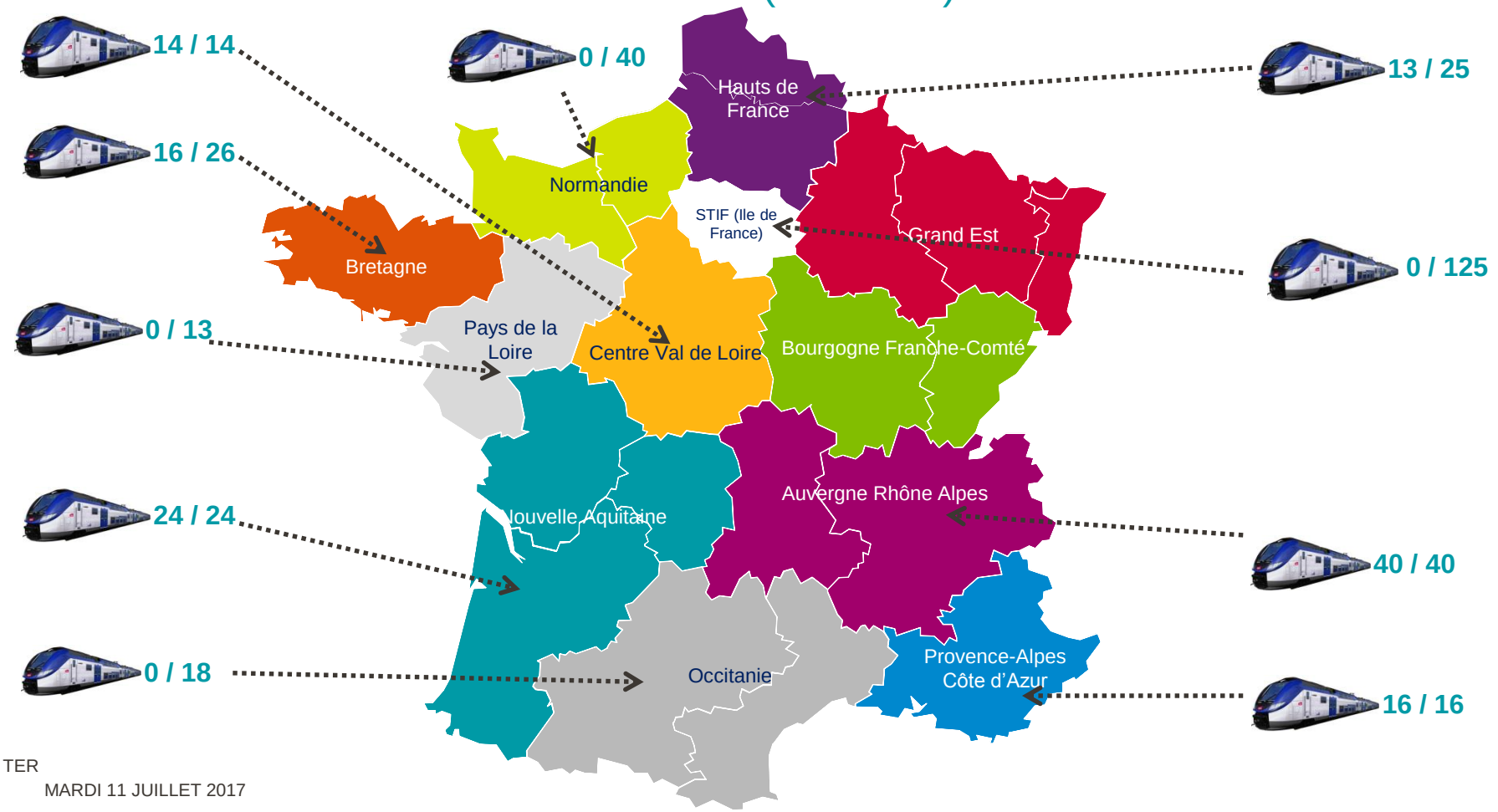
Today, SNCF orders to Bombardier for the French regions trains :

+ With 6 different length (from 81m to 142m)
+ With for a single unit, from 331 to 582 seat and from 654 to 1028 passengers with standing people
+ EMU able to run under 25kV 50hz AC or 1,5kV DC
+ Able to run at 160km/h and for some part at 200km/h
+ Approximately 3000 kW power on the catenary
+ Able to couple 3 units if the global length is less than 330m



REGIO2N DISPATCH (127 / 341)

Juin 2017



DG TER

MARDI 11 JUILLET 2017

THANK YOU.

Regio2N - Multiple options & customizations

Exemples of external liveries.

BOMBARDIER
l'évolution de la mobilité

Regio2N - Interior layouts modularity

regional 2+2

- Seats in 2+2 in DD cars (pitch 825 mm or 875 mm), 1 SWC per SD intermediate car gangway door every 2nd gangway, luggage racks and stacks

Periurbain 3+2

- Same with seats in 3+2 in upper deck of DD cars (pitch 825 mm or 875 mm)

Grande capacité

- Seats in 3+2 in upper and lower deck of DD cars (pitch 825 mm or 875 mm), only 1 SWC per train, no gangway door, no luggage racks nor stacks

Interville

- Seats in 2+2 (pitch 875 mm), first class in upper deck with seats in 2+1, platform doors, 2 SWC per SD intermediate car, additional luggage stacks

Wide gangways for maximum visibility

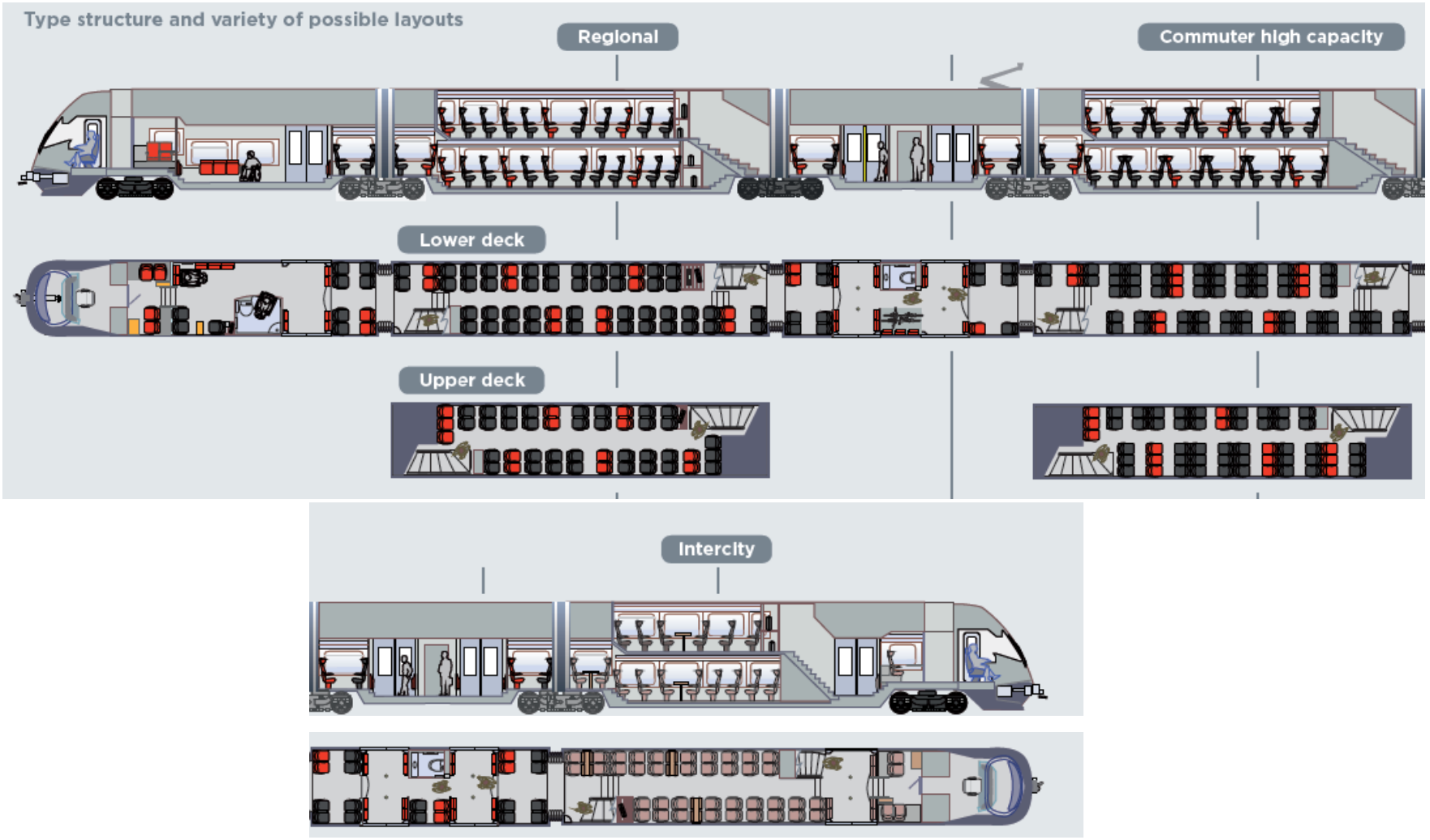
2+2 regional configuration, upper deck

3+2 commuter configuration, upper deck

Aménagement 3+2, salle bas

OMNEO Premium, 2+1 intercity configuration, 1st class, upper deck

Regio2N - Interior layout modulatity



BOMBARDIER
l'évolution de la mobilité

Regio2N - Multiple options & customizations

Additionally to the main layouts described, many options are available (~200) allowing multiple combinations:

- **Intermediate SD cars :**
  - Additional WC module or removal of a WC module
  - Bicycle rack : horizontal, vertical, with or without luggage stack
  - Platform doors
  - 2+1 seat configuration at gangways
  - ASCT room
- **DD cars**
  - Seat pitch 825 mm / 875 mm
  - Additional luggage stacks
  - First class in 2+2 for Periurbain
- **Seats**
  - Location of individual plug and reading light
  - Footrest, head cushion, removal of headrest

Regio2N - Multiple options & customizations

Each region can customize its train with

- a decorative pattern for the following interior equipment :
  - 1 type per Region per operation (ex : 1 type for Periurbain NPdC + 1 type for Interville NPdC) :

Equipment	Personnalization	Number of possible choices
Seats	Fabric	7
LED lighting	Colour	2
Floor covering	Rubber covering pattern	3
Internal doors	Film pattern	6
Luggage racks	Film pattern	6
Ceiling	Film pattern	6

- a personal external livery

Regio2N: Main technical challenges

- Innovant architecture
- Weight (Train designed for a normal load of 4p/m² and exceptional load of 8 p/m²)
- Self-ventilated permanent Magnet traction motors
- Safe train control network managing Doors and Brake functions
- High Integrity Brake (contribution of electrodynamic brake in emergency braking)
- HVAC only on Single Deck cars and air duct through the Gangway.
- Platform detection device on Doors :
  - Managing door opening in case of a short platform and gap filler for wheelchair access
- All options & customizations result in 111 different types of Regio2N vehicle
- First BT full TSI compliant train (PRM, Noise, Tunnel (Cat A), Loc and Pas)

BOMBARDIER

l'évolution de la mobilité

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EUROPEAN UNION AGENCY FOR RAILWAYS

The actors and the roles

BOMBARDIER — Manufacturer

SNCF — Applicant — Railway Undertaking

SNCF RÉSEAU — INFRASTRUCTURE MANAGER

CERTIFER — Designated Body — Risk Assessment Body

belgorail — Notified Body

epsf établissement public de sécurité ferroviaire — NATIONAL SAFETY AUTHORITY

Roles and responsibilities
The applicant

- Full responsibility for subsystem design operating state meeting the essential requirements:
  - The essential requirements for the railway system set out in Annex III of the Interoperability Directive
  - The essential requirements of other directives
  - The specific requirements contained within TSIs
  - The specific requirements contained in national rules

- The applicant signs an EC Declaration of verification to declare that he has discharged this responsibility.

- Bears primary responsibility in event of accident or incident calling into question conformity with the essential requirements at the time of authorisation

Roles and responsibilities
The NSA

- Carry out a check of the documents accompanying the application for placing in service and providing evidence of the adequacy of the verification procedure:
    - completeness, relevance and consistency of the documentation submitted for authorisation,
    - limited to matters within the competence of the National (railway) safety authorities as defined in Directive 2004/49/EC

The NSA Should:

- Check = Completeness, Consistency, Relevance
- Ensure the correct process is followed

The NSA may:

- When there are justified doubts call into question the work of Checking Bodies

The NSA Should not:

- Perform in depth verification/validation of Checking Bodies work/results
- Repeat checks
- Carry out/duplicate work of rule setters or Checking Bodies

Roles and responsibilities
The assessment bodies

- Notified Bodies
  - Verify conformity with TSIs and draw up the certificate(s) of verification intended for the applicant.
  - The notified body's verification "shall also cover verification of the interfaces of the subsystem in question with the system into which it is incorporated."

- Designated Bodies
  - Carry out exactly the same tasks in respect of national rules

- Risk Assessment Bodies
  - Review risk assessments procedures and issue safety assessment reports when the use of the CSM is required in the authorisation process by the Interoperability Directive or by a TSI.

The independence of the staff responsible for assessment must be guaranteed.

- e.g. "functionally independent of the authorities issuing authorisation"

Roles and responsibilities
The infrastructure manager

- In the case of tests of the vehicles on their network, the infrastructure managers have one direct role in the context of facilitating the authorisation process.
    - In the case of additional tests required by a national safety authority, for an additional authorisation *'the infrastructure manager, in consultation with the applicant, shall make every effort to ensure that any tests take place within 3 months of the applicant's request*'.

- The infrastructure manager has no power to impose a sort of second authorisation to the vehicles or trains of the railway undertakings.

Agenda of the session

- Presentation of the REGIO 2N project
- Presentation of the actors and their roles
  - presentations:
    - SNCF
    - Bombardier
    - EPSF

SNCF PRESENTATION

+ SNCF GROUP
+ SNCF BUSINESS UNITS

SNCF IS :

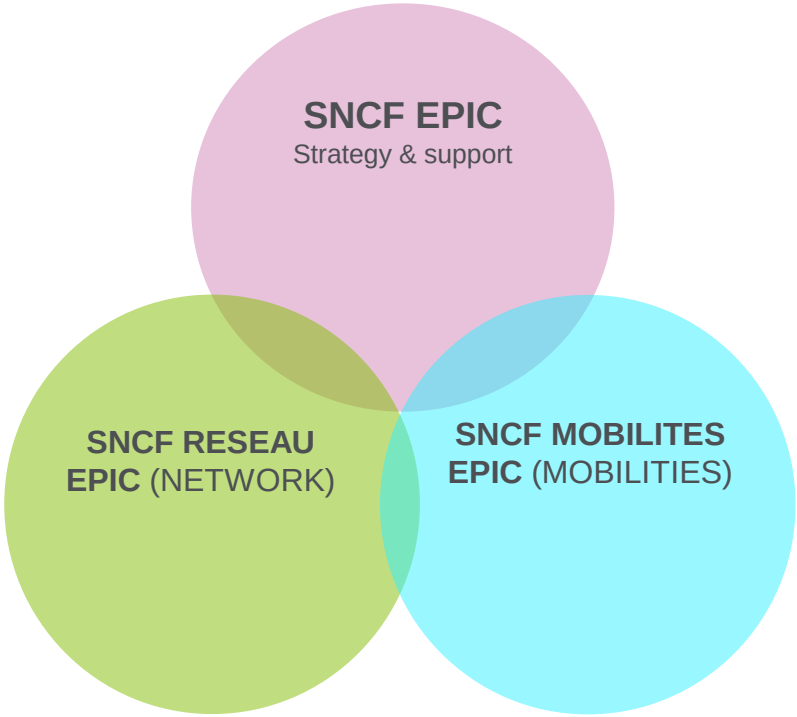
- 1 GROUP
- 3 EPICS
- 5 BUSINESS UNITS

SNCF GROUP

Our business?

Binging people together. Making passenger and freight transport seamless and easy. Designing and developing the mobility of tomorrow. And much more. To meet these challenges, SNCF Group has reorganized into three components :

+ SNCF EPIC to set overall Group strategy
+ SNCF Réseau (Network) EPIC to manage, operate and develop the French rail network
+ SNCF Mobilités (Mobility) EPIC to transport passengers and freight



€31.4 bn revenue	260,000 employees
33% of revenue comes from outside France*	120 countries
€8.2 bn in investments (all funding sources combined)	13.5 million passengers carried daily, in France and around the world

SNCF : 5 BUSINESS UNITS

SNCF RÉSEAU
(ÉPIC SNCF RÉSEAU)

Access to France's rail network infrastructure, including allocating capacity and establishing infrastructure fees

Management of network traffic

Infrastructure maintenance and renovation

Network expansion and development, with a focus on overall efficiency and optimum value

Rail engineering expertise within SNCF Group through Systra

SNCF VOYAGEURS
(ÉPIC SNCF MOBILITÉS)

Transilien: public transport for the Paris region

TER: regional trains

Intercités: classic train service

Voyages SNCF: high-speed trains, long-distance coaches in France and Europe, ticket sales

Gares & Connexions: station management and development*

KEOLIS
(ÉPIC SNCF MOBILITÉS)

Public transport for passengers in France and worldwide

Operation and maintenance of all transport modes, plus related services

Management of intermodal infrastructures including carparks

SNCF LOGISTICS
(ÉPIC SNCF MOBILITÉS)

Geodis: freight transport and logistics in France and 120 countries worldwide

TFMM: rail & multimodal freight transport

Ermewa Group: equipment management

STVA: automobile/vehicle logistics

SNCF IMMOBILIER
(ÉPIC SNCF)

Management of SNCF's property portfolio

Monetization of buildings and land

Management and development of residential properties

More information at : http://www.sncf.com/en/group

ROLES OF SNCF IN THE PROJECT

SNCF Mobilités (Passengers) :

+ Make overview of Regions needs
+ Write the rolling stock specifications
+ Management of the tender for rolling stock and the contract with the manufacturer
+ Applicant to get EPSF commercial operation authorization
+ Trains operator
+ Maintain the rolling stock

SNCF Réseau (Network) :

+ Will propose to EPSF to authorize exceptional circulations for testing on the network
+ Will be consulted by EPSF before delivery of the commercial operation authorization
+ Study the conditions of compatibility of the rolling stock with the infrastructure
+ Adapt if needed the infrastructure to receive the rolling stock

BOMBARDIER
Overview

Bombardier is the world's largest manufacturer of both planes and trains, with a worldwide workforce of **70,900**(1) (2) people.

Bombardier is headquartered in Montréal, Canada. Our shares are traded on the Toronto Stock Exchange (BBD) and we are listed on the Dow Jones Sustainability World and North America indexes. In the fiscal year ended December 31, 2015, we posted revenues of **18.2 billion USD.**

(1) As at December 31, 2015, including contractual and inactive employees. Subsequent to the end of the fiscal year, we decided to take steps to optimize our workforce with a combination of manpower reduction and strategic hiring. These figures do not reflect the planned changes.

(2) 3,950 product development engineering, Corporate office and other employees are not allocated to a reportable segment.

BOMBARDIER
Our evolution

1942-1973

- Company start-up
- Development of passenger and personal snowmobiles
- Vertical integration
- Energy crisis provoked market collapse

1974-1985

- Diversification into mass transit market
- Learning of new industry
- 1982 New York metro contract secured strong position in American market

1986-1993

- Entry into aerospace through Canadair acquisition
- Consolidation of North American mass transit position and reinforcement of presence in Europe

Strategic Acquisitions

- Aerospace: Short Brothers (UK), Learjet (US), de Havilland (CA)
- Transportation: BN (BE), ANF (FR), Deutsche Waggonbau (DE), Concarril (MX), Talbot (DE), Adtranz (DE)

1993-2003

- CRJ Series, Global Express, Challenger 300
- Tilting train, AGC (Autorail Grande Capacité)
- Sale of Recreational products business unit

2003-

- CRJ NextGen family, Learjet 85, Q400 NextGen, Global 7000, Global 8000
- Hybrid AGC, ZEFIRO, ECO4, Regio2N
- Transportation's expansion into emerging markets

OUR PRODUCTS AND SERVICES
The broadest portfolio in the rail industry

Rail Vehicles

- Light rail vehicles
- Metros
- Commuter trains
- Regional trains
- Intercity trains
- High speed trains
- Locomotives

Transportation Systems

- Driverless Systems: Monorails, Metros, People Movers
- Light rail systems
- Metro Systems
- Intercity Systems
- E-mobility Solutions
- Operations and Maintenance

Services

- Fleet Management
- Asset Life Management
- Material Solutions
- Component re-engineering and overhaul

Rail Control Solutions

- Integrated control systems
- Automatic train protection and operation
- Interlocking systems
- Wayside equipment
- Services

Propulsion & Controls

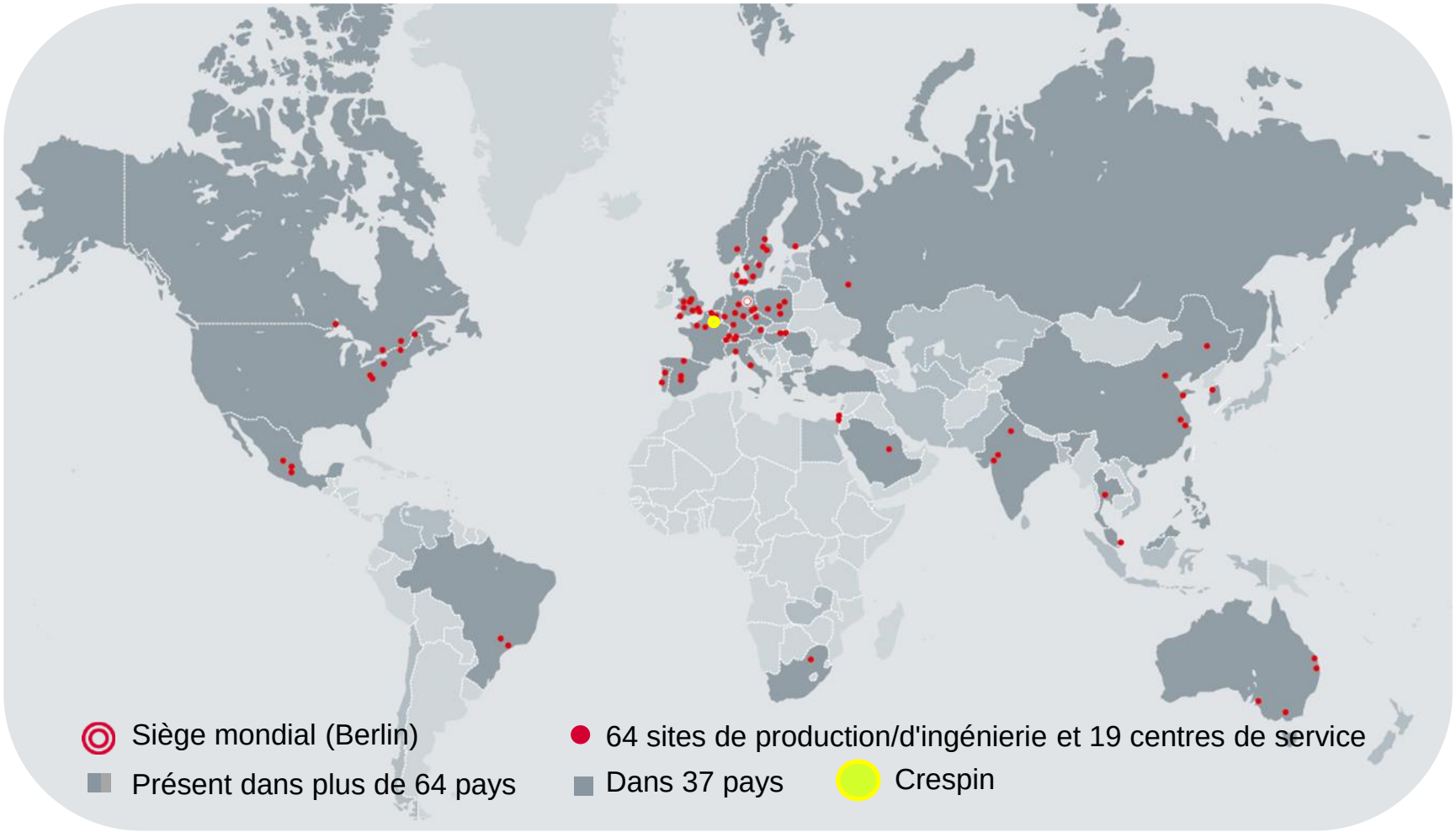
- Traction converters
- Auxiliary converters
- Traction drives
- Control and communication

Bogies

- Portfolio to match entire range of rail vehicles
- Full scope of service over the lifetime of a bogie

BOMBARDIER
l'évolution de la mobilité

BOMBARDIER TRANSPORT
Expertise mondiale – Présence locale



BOMBARDIER
l'évolution de la mobilité

Crespin site is able to manage a project from A to Z.







Competencies and expertise to design, build , authorize and maintain a train.

- Marketing & sales
- Project management
- engineering
- Industrialization & tooling
- procurement
- Logistic
- Manufacturing & quality management
- testing (static & dynamic)EN17025
- After sales services (product introduction and refurbishing / product enhancement)
- Bogies (conception & manufacturing)







BOMBARDIER
l'évolution de la mobilité

Quelques références historiques

Virgin - UK

Navettes Transmanche

Francilien

Regio2N

Z2N - Paris RER

Métro de New-York

MF2000

TER2N - Train Régional

Autorail Grande Capacité

TER 2N NG

TGV Duplex

MI2N – Paris RER

BOMBARDIER
l'évolution de la mobilité

Role in Regio2N project

- Bombardier was chosen by SNCF to design, manufacture and test the trains.
- Bombardier is also proposer meaning that Bombardier have the mandate to hire the NoBo, prove the compliance to TSI and get the EC verification certificate.
- The applicant (requestor of authorisation toward authorities) is SNCF.

The French Railway Safety Authority

Contents

- The legal framework
- Missions
- Management Structure
- Organizational Chart
- Authorisations

Regulatory Framework

- EPSF is the French national safety authority created as part of the **European Directive 2004/49/EC**. It was created as a public administrative authority under the **French Law 2006-10 of 5th January 2006.**

- Its missions and operations are defined in the **Decree 2006-369 of 28 March 2006** and fall within the framework defined in the **Decree 2006-1279 of 19 October 2006** on safety of rail traffic and interoperability of the rail system, which transposes the European directives on the subject into national law.

Scope of action

EPSF's scope of action covers the **national rail network** (RFN).

This changed in early 2015 with the publication of the decree no. 2015-84 of 28th January, which establishes the list of networks whose operating characteristics are comparable to those of the national rail network. Therefore, the safety regulations are applicable to the national rail network with certain modifications.

EPSF's powers are thus extended to include major seaports that possess and operate rail lines.

Missions (1/2)

EPSF ensures compliance with the regulations on safety and interoperability of rail transport.

As such, EPSF's main missions are to:

- → **Issue** authorisations required by railway stakeholders to operate in France;
- → **Ensure** compliance with the terms of the authorisations through audits and inspections;
- → **Monitor** the level of safety and organize feedback;

Missions (2/2)

→ **Participate** in developing regulations;

→ **Disseminate** best practices.

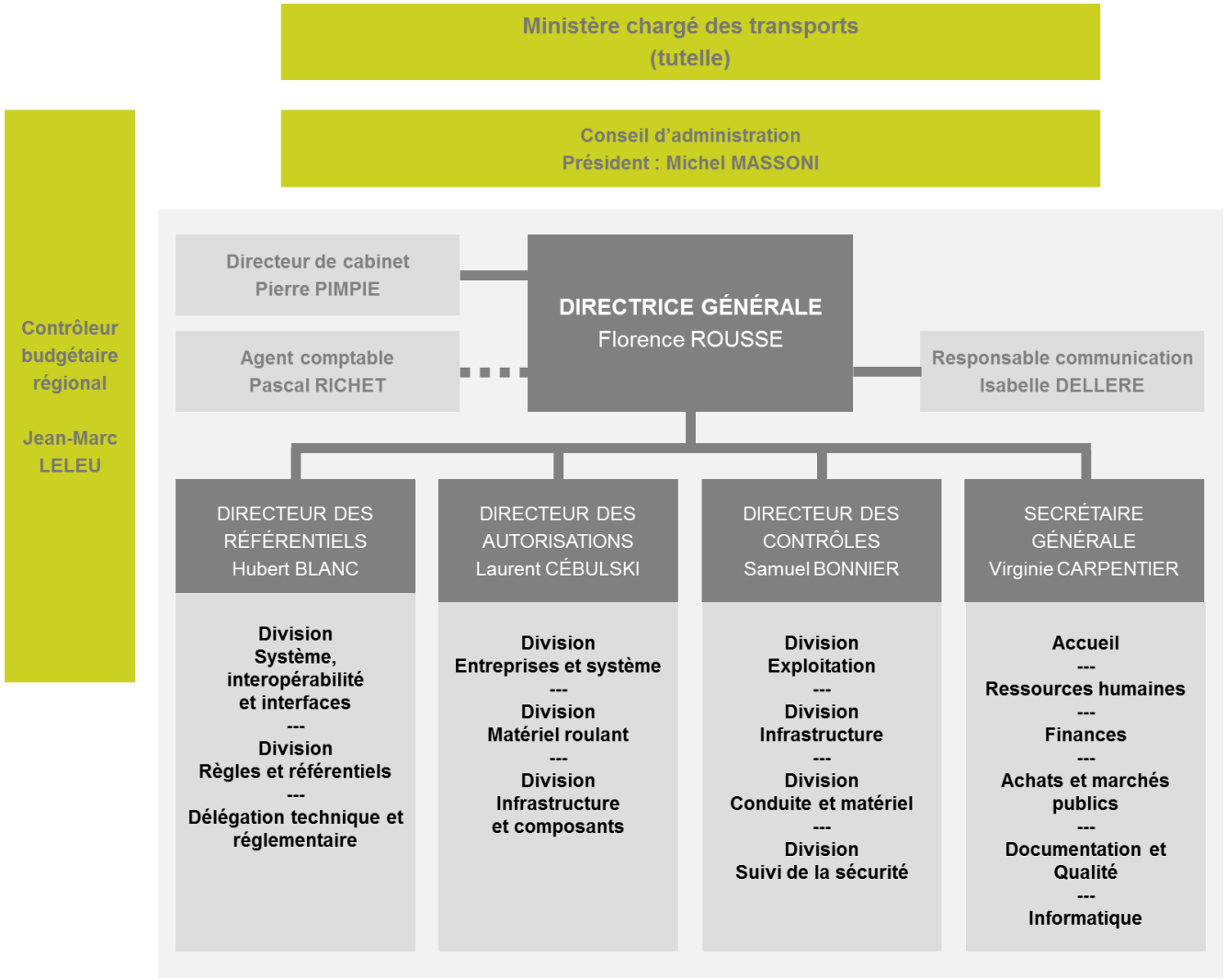
Within the European Community, EPSF works with ERA to undertake actions (regulatory development), as well as with the other national safety authorities (sharing best practices, establishing common positions, etc.).

Management Structure

- The executive director, Florence Rousse, performs the executive functions of the authority. She issues the authorisations.

- The Supervisory Board makes decisions concerning the operation of the authority. It is composed of representatives of the French State, two Members of Parliament, qualified persons and two employee representatives.

Organizational Chart



Authorisations

EPSF issues:

→ Commercial operation authorizations for new systems (AMECs) (rolling stock and infrastructure)

- These are required for rolling stock to run in France, as well as for new lines and new technological systems.

→ Safety certificates for railway undertakings

- These confirm their ability to operate rail transport services (freight, passengers, etc.) on part or on all of the national rail network.

→ Safety approvals for infrastructure managers

- These confirm their ability to manage the railway infrastructure (infrastructure development and maintenance, and rail traffic management) they are in charge of.

EPSF also issues:

→ Approval certificates for “training and evaluation organisations” as well as “organisations in charge of organising general professional knowledge examinations for drivers”;

→ European train drivers’ licences;

In addition to these missions, EPSF also registers all the rail vehicles running on the national rail network and maintains the corresponding register (national register of vehicles).


Safety Approvals for infrastructure Managers (IM)
Safety Certificates For Railway Undertakings (RU)
National Rail Network
Commercial operation authorisation (AMEC) of systems or sub-systems
Infrastructure
Rolling Stock

2006

epsf
établissement public de sécurité ferroviaire

Établissement
Public
Administratif

Approx. 100 people

Infrastructure

Safety
Certificates (RU)

Safety
Approvals (IM)

Rolling
Stock

European Train
Driver Licence

Training and evaluation
Organisations

Authorisations Directorate

Audits
Inspections
Operational Controls

Feedback
(safety-related events)
(data base)

Monitoring Directorate

Animation of
Return of experience

Regulations

MAC

SAM/SAMI
Operation texts

Guides

Mutual
Recognition Agreements

Diffusion, animation, pedagogy

Safety and Interoperability Regulations Directorate

General Secretariat

IT
Department

Archive
Documentation

Accounting

Human
Resources

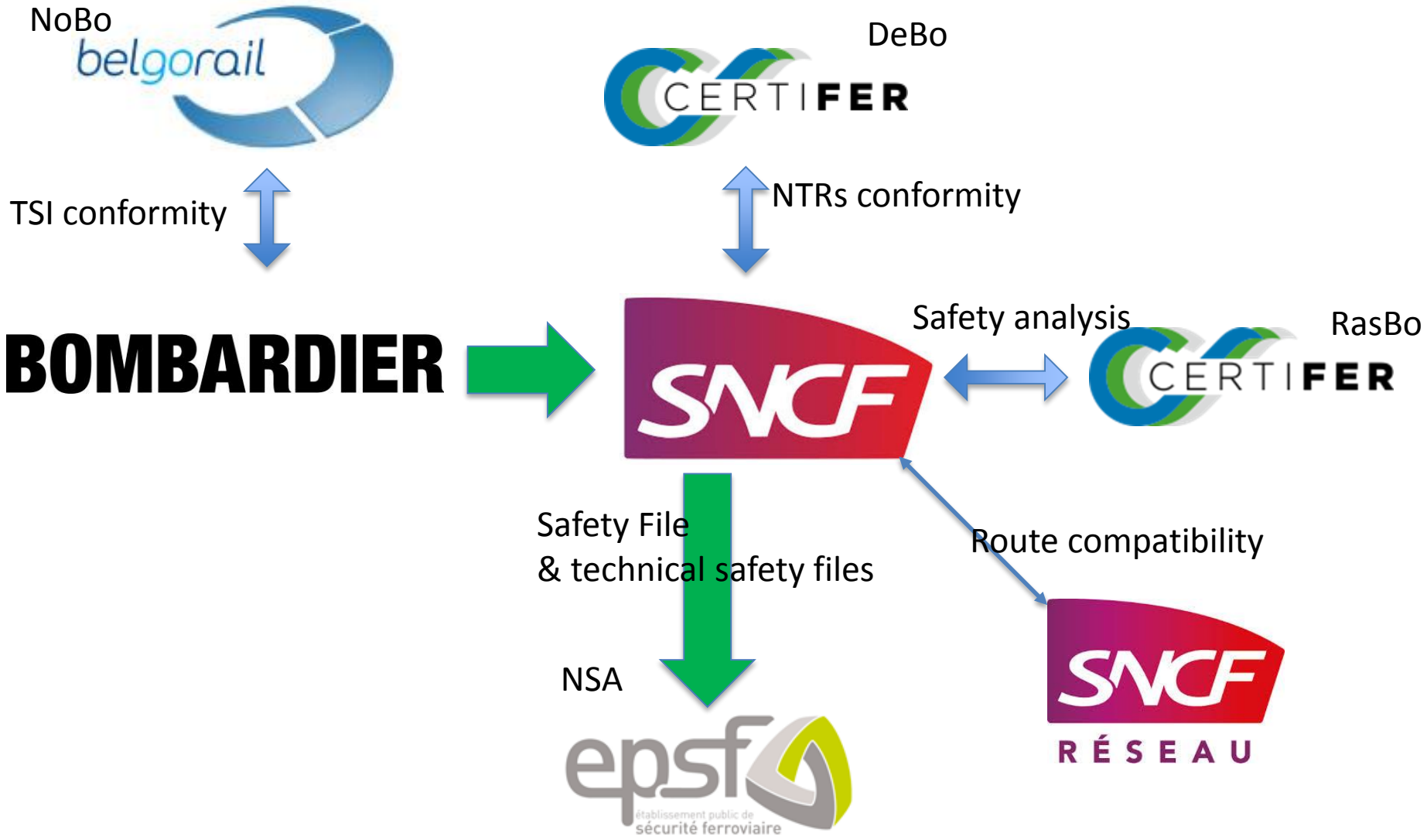
Procurement
Dpt

Rolling stock

Regio2N EMU

→ AMEC issued on 26th of September, 2014

So… here is the picture



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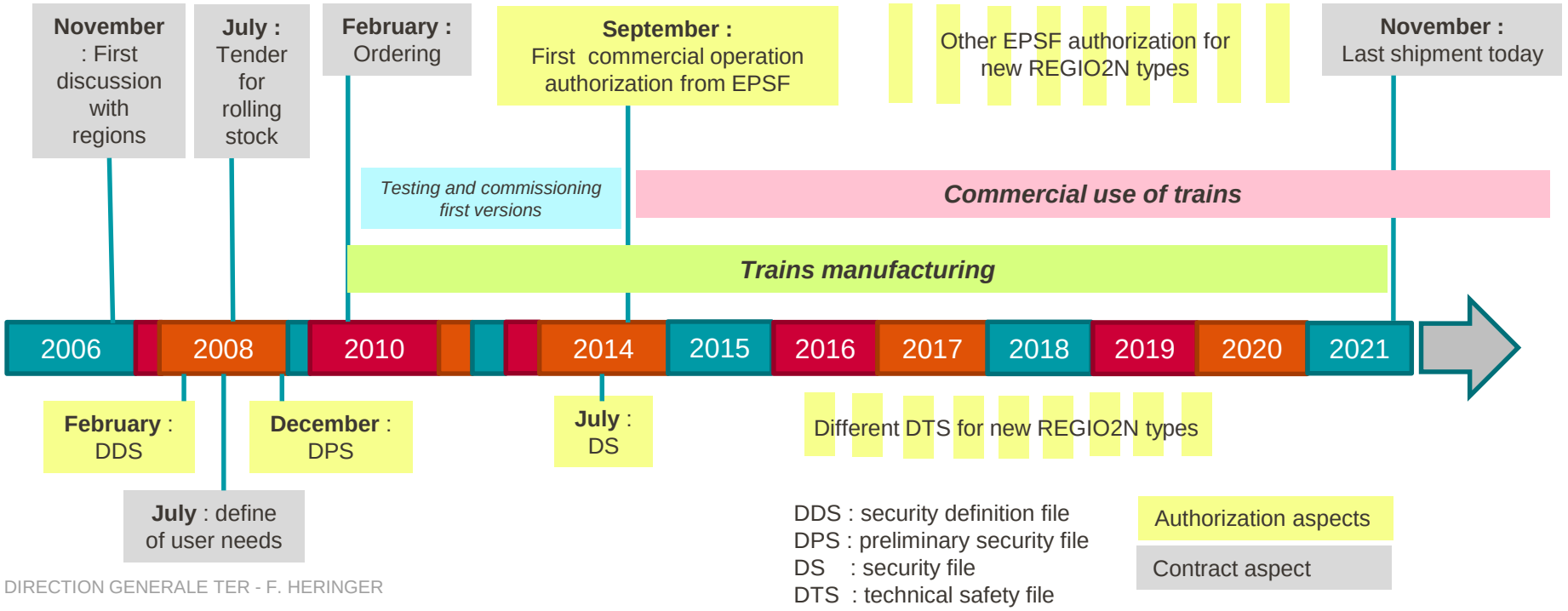
      - EPSF

SCHEDULE OF THE PROJECT

341 TRAINS IN MANUFACTURING OF THE 860 POSSIBLE IN THE CONTRACT



DIRECTION GENERALE TER - F. HERINGER

Pre-engagement and Regulatory framework

ERA Training in Budapest (Regio2N) – 28th of June 2017

Regulatory framework

Pyramide des normes juridiques

Bloc de constitutionnalité

Bloc de conventionalité

COTIF
Traité de l'Union européenne
Droit dérivé de l'Union européenne
(Directives, Règlements, ….)

Bloc de légalité

Lois / Codes / Ordonnances

Bloc réglementaire

Décrets / Arrêté

Art. 10 Décret n° 2006-1279

Documentation d'exploitation
Règles d'exploitation particulières

Publication EPSF

SAM / SAMI / Textes exploitation dont certains ont valeur de moyen acceptable de conformité (MAC)

Documentation de l'exploitant ferroviaire

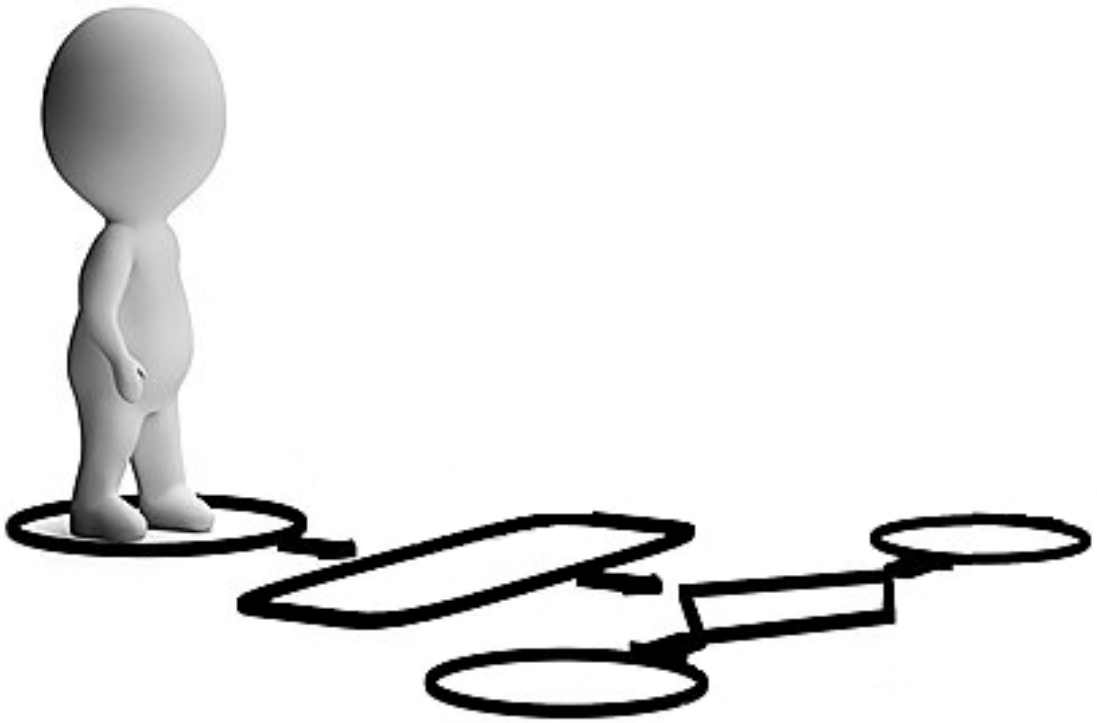
Documents du SGS - Consignes - Instructions - Documents métier ...

epsf

APIS (Autorisation for placing in service)

AMEC (autorisations de mise en exploitation commerciale) de véhicules

General overview of the autorisation procedure



Safety Design Phase
Dossier de conception de la sécurité (DCS)

Nota : Before 2010, therefore Regio2N

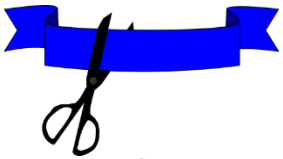
At the beginning of conception : DDS (Definition)

At the end of conception : DPS (Preliminary)

At the end of the study phase of conception

Safety File (DS : Dossier de sécurité)

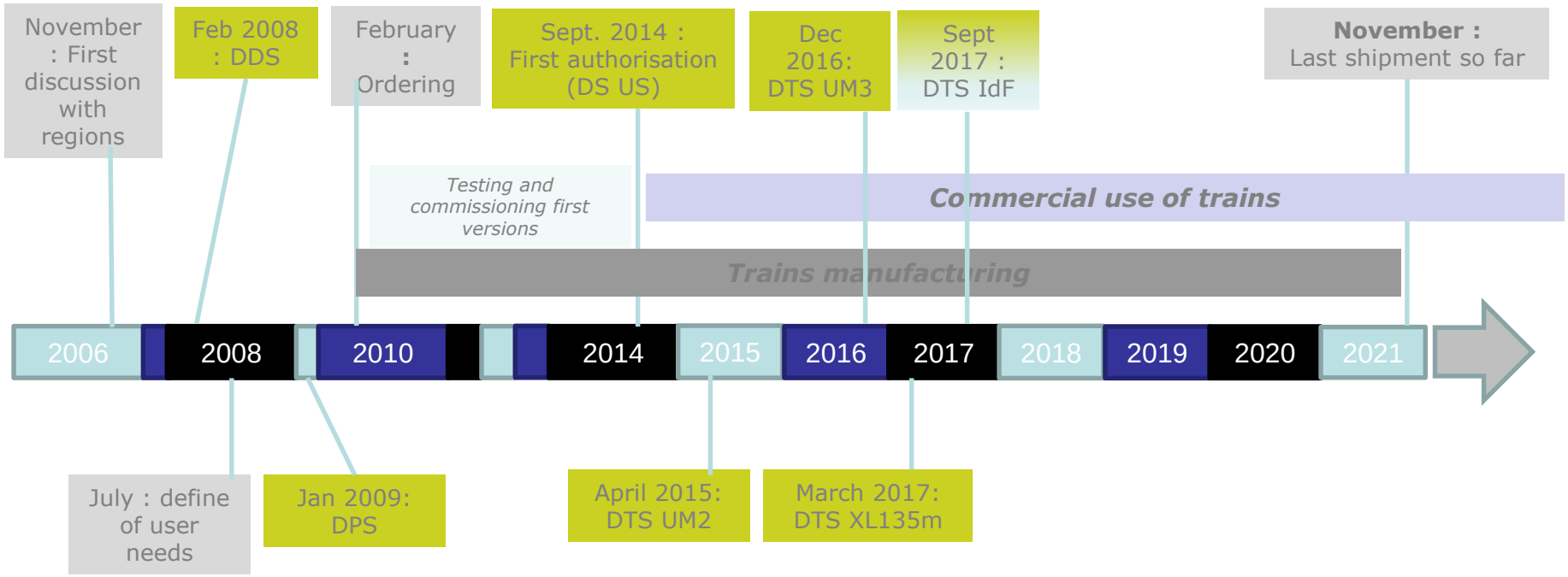
At the end of realisation

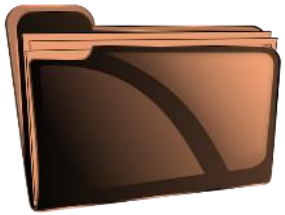


AMEC

Schedule of the project

- 341 trains ordered so far, out of the 860 possible in the contract





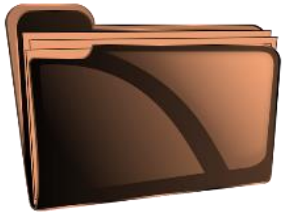
Safety Design File (Dossier de conception de la sécurité : DCS)

1. The first stage, **following study** of the vehicle design, is finalised by the safety design file (DCS).

2. The purpose of the DCS is to clarify the **safety objectives** and the **methods to be applied** in order to meet them, that are the demonstration methods and the guidelines which will ensure that the vehicle will comply with safety standards throughout its period of operation.

3. At this stage in the procedure, any technical or regulatory reservations detected by the EPSF must have been overcome.

:



Safety Design File Contents (Dossier de conception de la sécurité : DCS)

a) A general notice concerning the project including:

- the organizational procedure for the vehicle project and the responsibilities of collaborating parties (including **DeBo**, **NoBo** and **AsBo**),
- a brief description of the project with the conditions for **safe integration** in the system where it is intended to be operational;
- the estimated construction schedule indicating the dates of commencement of the main technical phases and, if necessary, of tests and trials.

b) The list of **regulatory and technical standards** applicable to the project (and derogations);

c) A technical description to demonstrate safety and stating :

- technical and functional characteristics, innovations, any design variants;
- operating and maintenance guidelines envisaged to comply with regulations and to ensure that safety objectives can be met throughout the expected operational life of the vehicle;
- where applicable, the procedures for the consideration within the project of the requirements for intervention by the emergency services;
- the risk management process and a preliminary risk analysis.

4th Railway Package - Pre-engagement

- Stage preceding the submission of an application,
- Performed upon request of the applicant,
- Is recognised as good practice to facilitate the development of the relationship between the parties involved,
- Aim of enabling the concerned NSA(s) to become familiar with the project, and clarifying :
    - The baseline for the applicable rules,
    - The details of how the vehicle authorisation process will be conducted,
    - How decisions will be made and
    - Verifying that the applicant has received sufficient information to know what is expected of it.

Agenda of the session

- Presentation of the REGIO 2N project
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  - Requirements capture and definition of types
  - Design, production, assessment of conformity
  - Compiling the files, assessment and authorisation
- After the authorisation
- Conclusion

Agenda of the session

- The story of the project:
  - Requirements capture and definition of types
    - presentations:
      - Bombardier
      - SNCF

Regulatory Framework

- **Regulations established by the European Railway Agency:**
  - Directive 2008/57/EC on the interoperability of the rail system within the Community
    - 2011/217/CE recommendation on the authorization for placing in service of subsystems of a structural nature and vehicles
  - Directive 2004/49/EC on safety on the Community's railways
    - Regulation 352/2009 concerning the Common Safety Method on the evaluation and assessment of risks
- **Regulations established by the French Ministry**
  - Decree 2006-1279 related to railway safety and interoperability
  - Decree of 19 March 2012 laying down the objectives, methods, safety indicators and technical regulations applicable to safety and interoperability on the national network
  - Decree of 23 July 2012 concerning authorizations to put in service vehicles or other subsystems of new or substantially modified

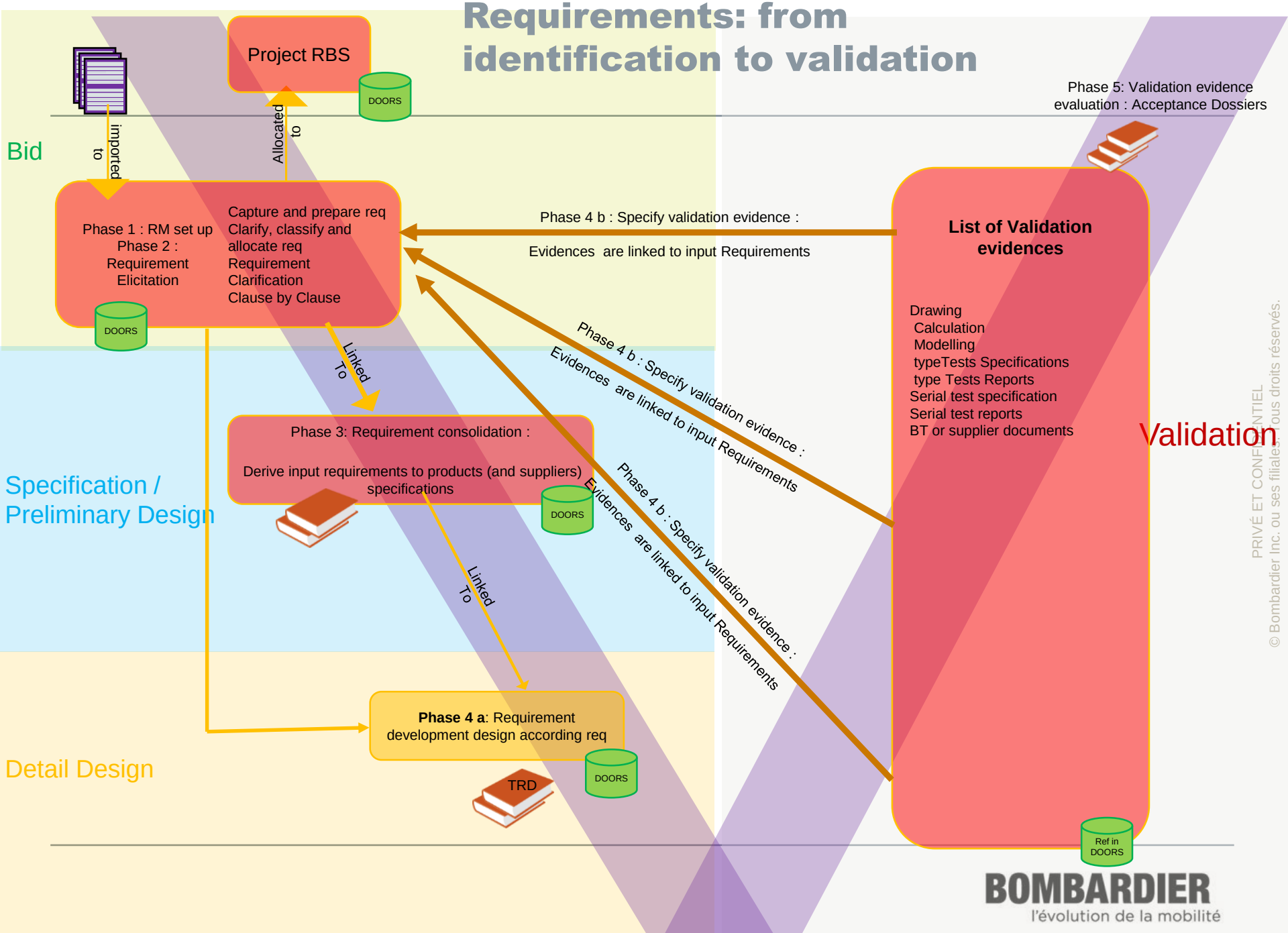
Technical rules

- **Technical Specification for Interoperability (TSI) :**
  - Aim : Ensure the interoperability of the European network
  - Cover essential requirements: Safety , Reliability, Availability, Health, Environmental and technical compatibility
  - They are published by the European Commission, they are applicable in each Member State
  - **Rolling Stock TSI : ~1330 applicable Requirements :**
    - TSI relating to persons with reduced mobility 2008/164/EC
    - TSI relating to the subsystem rolling stock - noise 2011/229/UE
    - TSI relating to Safety in Railway Tunnels 2008/163/EC
    - TSI relating to the control-command and signalling subsystems (CR and HS) : not applicable no ERTMS on board
    - TSI relating to the rolling stock subsystem -'Locomotives and passenger rolling stock' 2011/291/UE
- **National Technical Rules :**
  - **Shall cover open point, specific cases and compatibility with existing infrastructure (~960 requirements)**
    - Appendix of French Arrêté Juillet 2004
    - Applicable Acceptable Mean of Conformity (SAM : 41 documents)
- **NB** : mean of compliance can be design evidences (drawing, calculation notes etc,) or test evidences.

Requirement capture

- BT put in place a strong requirement management process to succeed! and have choosen **IBM**® Rational® **DOORS**® to manage the requirements.
- BT use the same process for TSI or National rules even if the assessors ~~was~~ were different.
- The requirement management (incl V&V)has started at the early beginning of the project, in tender phase.
- requirement management (incl V&V) cover all stages : design, manufacturing and testing but a lot of requirements request some control, serial testing evidences to prove that we are compliant all along the manufacturing process.
  - Example Weight requirement

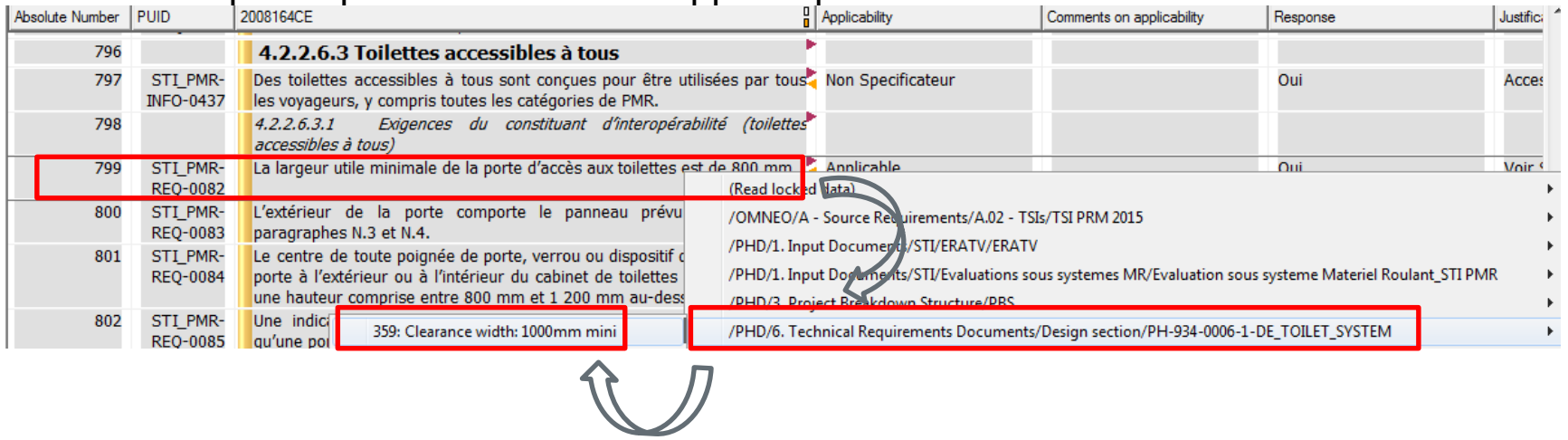
Requirements: from identification to validation



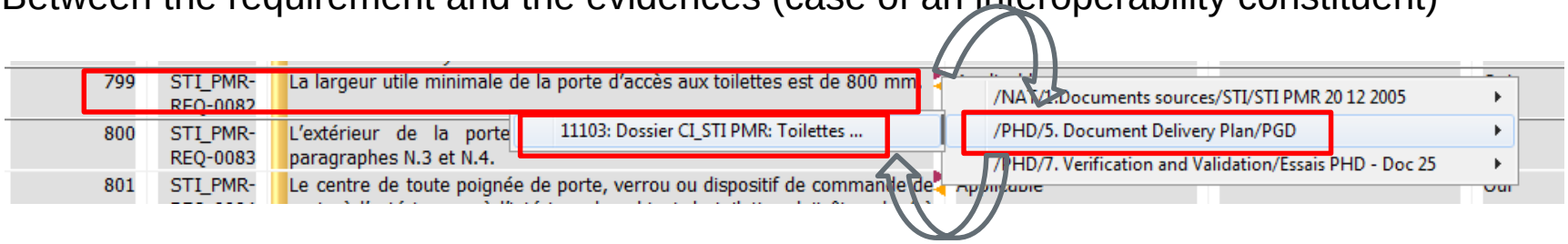
BOMBARDIER
l'évolution de la mobilité

Example of requirement traceability : dimensions in TSI PRM

Between the input requirement and the supplier specification :

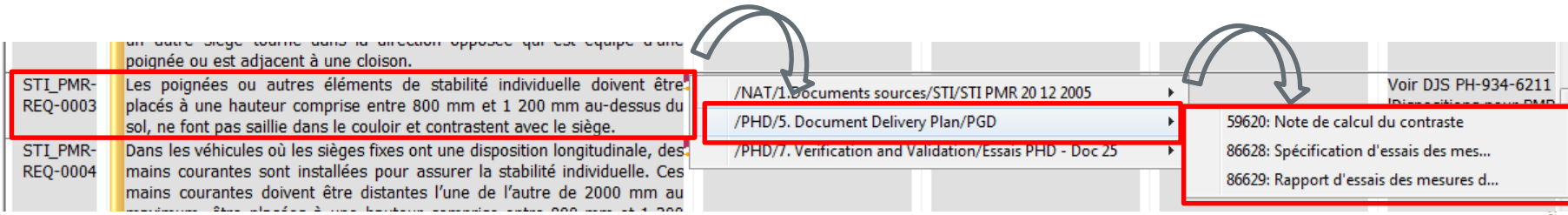


Between the requirement and the evidences (case of an interoperability constituent)



BOMBARDIER
l'évolution de la mobilité

Example of requirement traceability : dimensions in TSI PRM : BT requirement



On top of that, the NoBo will assess that the production quality management system takes into account the TSI PRM dimensions (ie : presence of quality check or serial tests) during the QMS audits.

THE DIFFERENT COMMERCIAL OPERATION AUTHORIZATION

1 DS (SAFETY FILE FOR FIRST AUTHORIZATION) AND 10 DTS (NEW AUTHORIZATION)

<table>
<tr><th>Type of rolling stock</th><th>AMEC US</th><th>AMEC UM2</th><th>AMEC UM3</th></tr>
<tr><td>Z courte 1 de 81m V160</td><td rowspan="3">26/09/14
(Suite DS)</td><td rowspan="3">30/04/15
(suite DTS n°1)</td><td rowspan="2">09/12/16
(suite DTS n°2)</td></tr>
<tr><td>Z courte 2 de 83m V160</td></tr>
<tr><td>Z moyenne 2 de 95m V160</td></tr>
<tr><td>Z longue de 110m V160</td><td></td><td></td><td>DTS n°10</td></tr>
<tr><td>Z extra longue de 135m V160</td><td colspan="2">31/03/17 (suite DTS n°3)</td><td>Sans objet</td></tr>
<tr><td>Z longue IdF de 110m V160</td><td>DTS n°4</td><td colspan="2">DTS n°5</td></tr>
<tr><td>Z longue IdF de 105m* V160</td><td colspan="3">DTS n°5</td></tr>
<tr><td>Z longue 110m V200</td><td colspan="2">DTS n°6</td><td>DTS n°9</td></tr>
<tr><td>Z extra longue 142m V200</td><td>DTS n°7</td><td>DTS n°8</td><td>Sans objet</td></tr>
</table>

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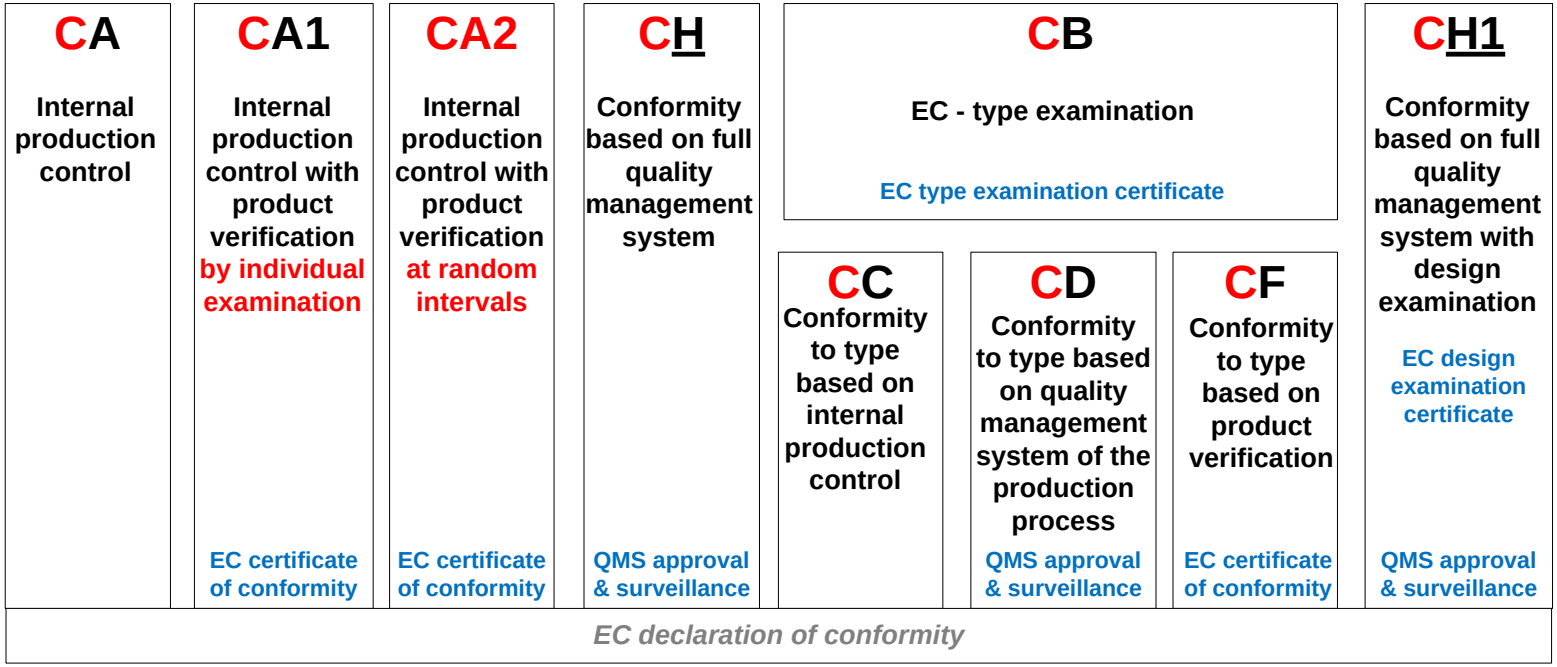
EC verification procedure
Assessment Modules

- EC Verification procedure is based on application of assessment Modules.
- Modules are :
  - Described in decision 2010/713/CE,
  - Covering procedures for conformity assessment (ICs) and EC verification (subsystems),
  - Defining responsibilities of participants in the procedures : Manufacturer, applicant, notified body etc.
  - Specifying necessary documents to attest conformity : Technical documentation, certificates, declarations, etc.

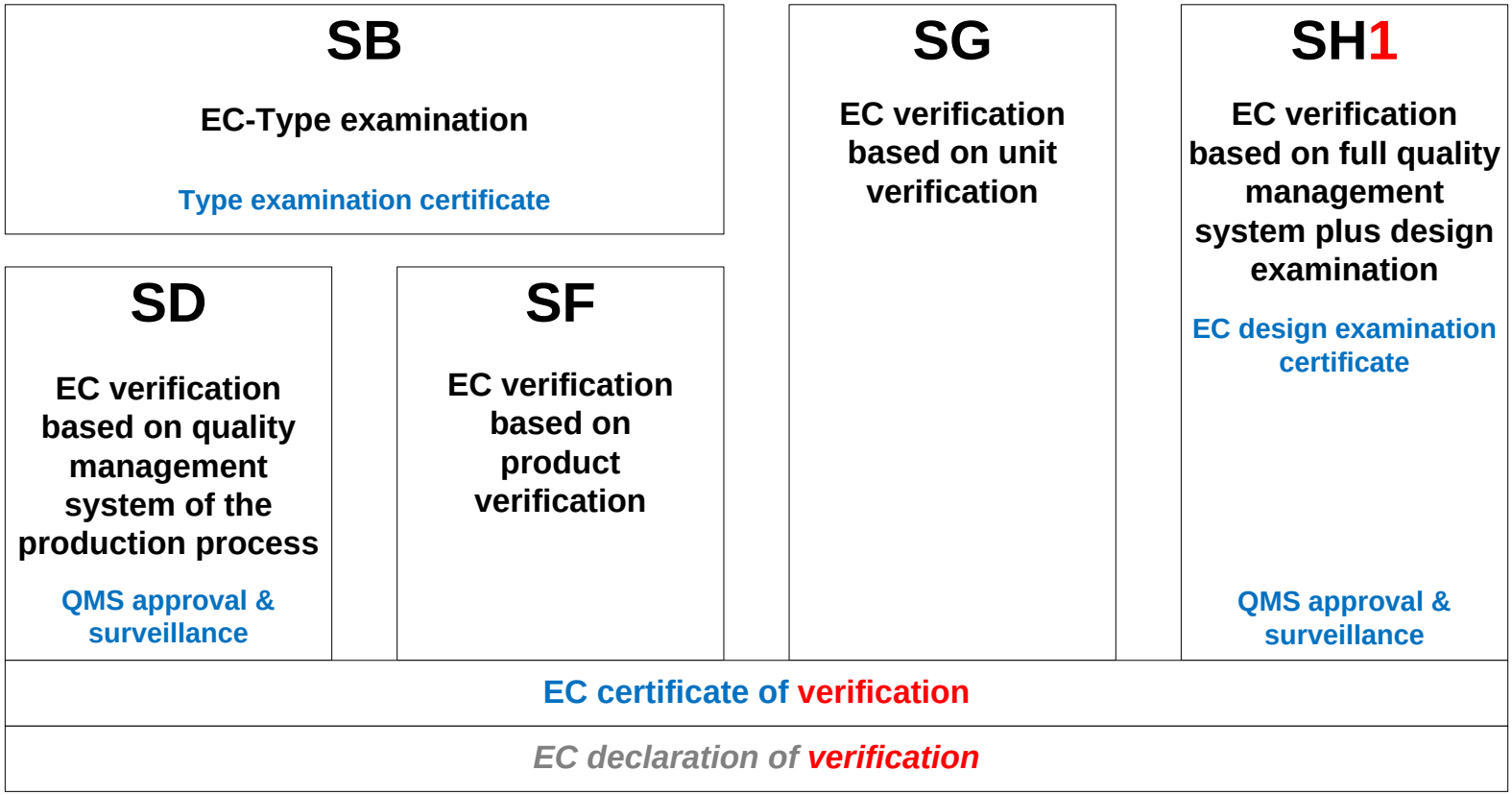
EC verification procedure
Modules for interoperability constituent (ICs)

STRUCTURE OF NEW MODULES FOR INTEROPERABILITY CONSTITUENTS ASSESSMENT



Documents issued by notified bodies
Documents issued by manufacturers

EC verification procedure
Modules for subsystems



Documents issued by notified bodies
Documents issued by applicant
(contracting entity or manufacturer)

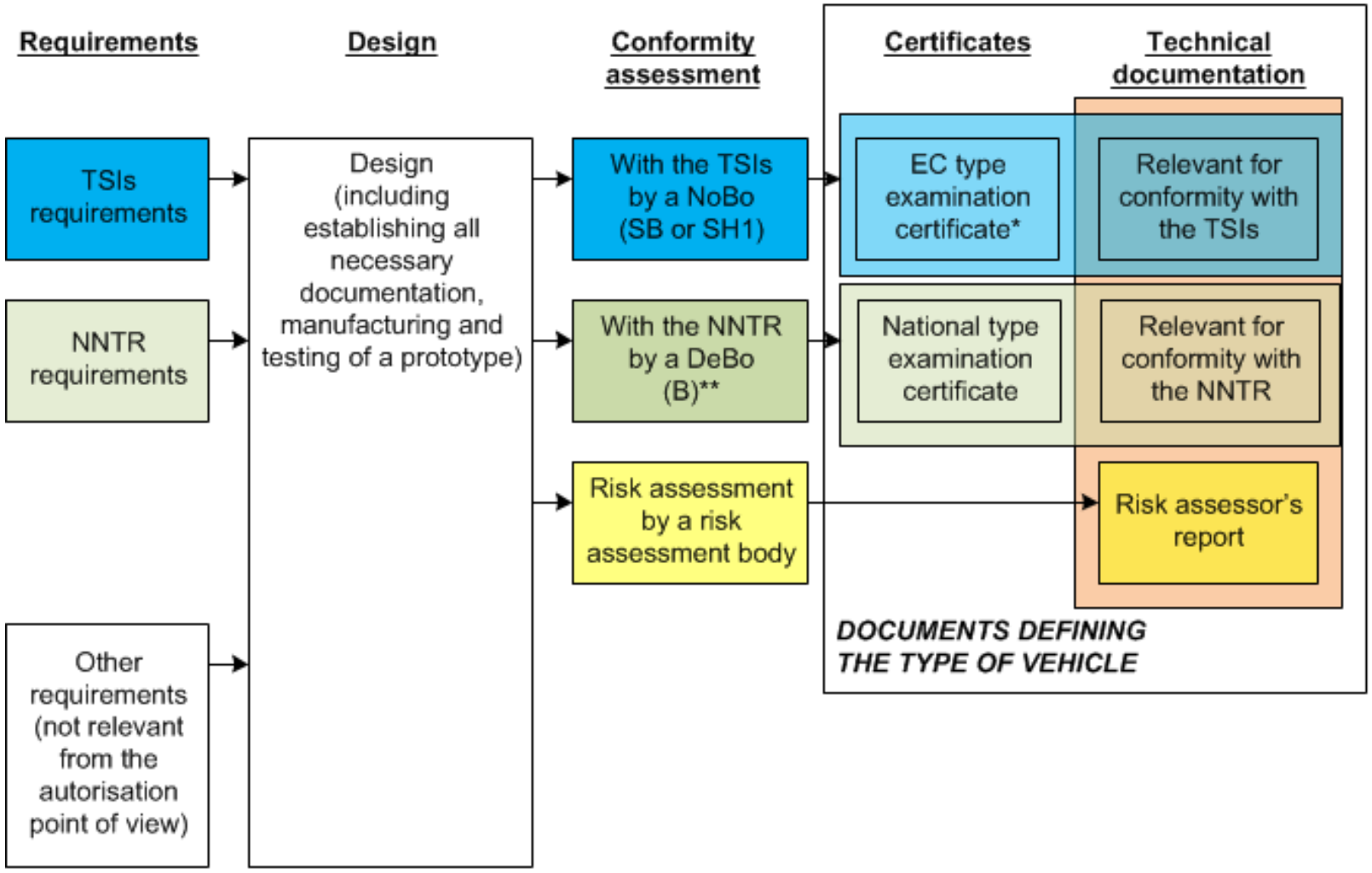
EC verification procedure
Assessment Modules

- TSIs specify in chapter 6 the application of assessment modules.
- Some modules can be used only in combination with others.
- Modules may involve third party assessment (NoBo) or self-assessment (modules CA, CC).
- TSI Loc&Pas for Interoperable Constituents (Eg. For coupler) :

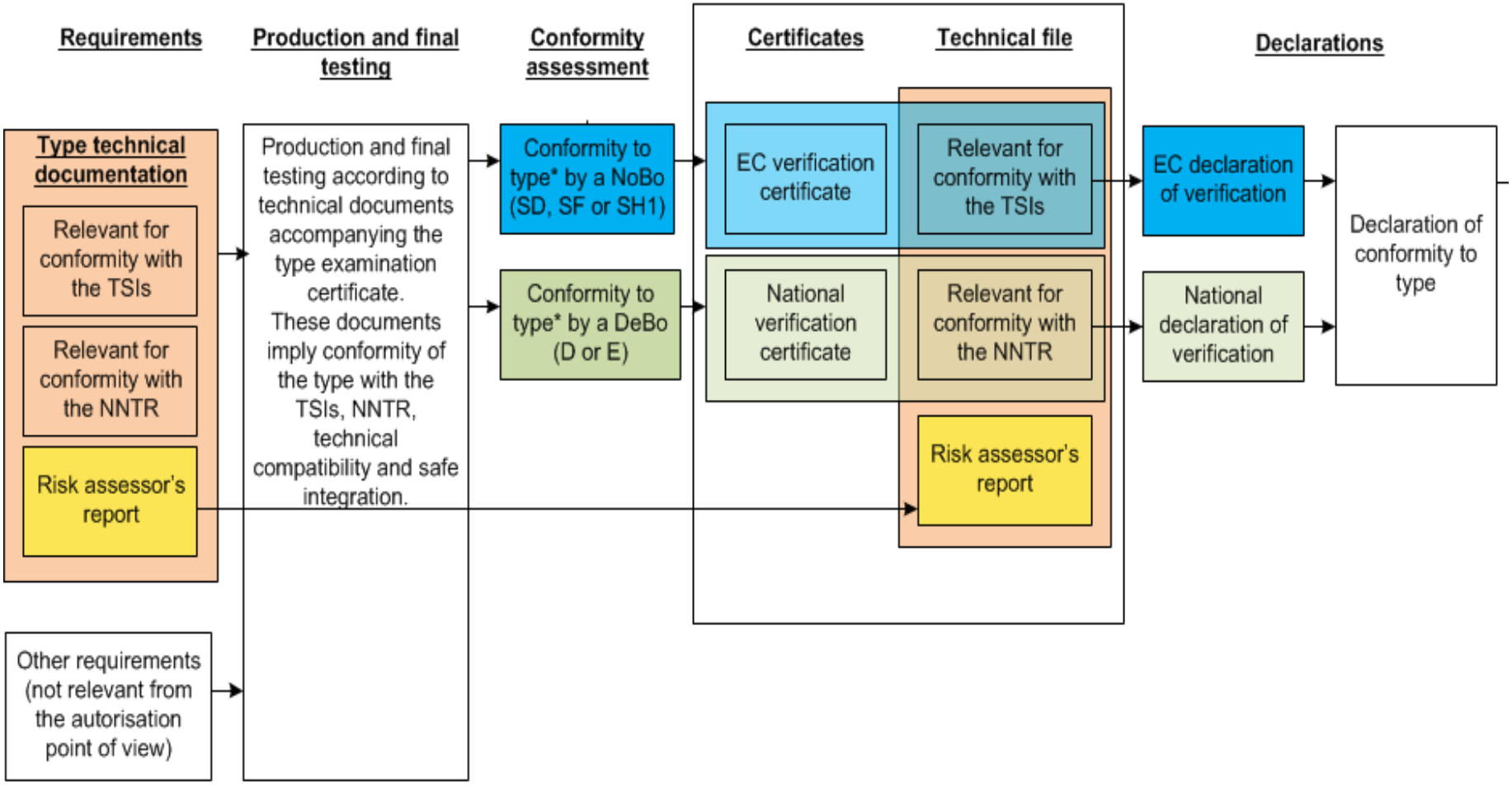
Point	Constituents to be assessed	Module CA	Module CA1 or CA2	Module CB + CC	Module CB + CD	Module CB + CF	Module CH	Module CH1
5.3.1	Automatic centre buffer coupler		X (*)		X	X	X (*)	X
5.3.2	Manual end coupling		X (*)		X	X	X (*)	X

- TSI Loc&Pas for Rolling Stock :
  - Applicant shall choose one of the following combinations of modules : (SB+SD) or (SB+SF) or (SH1). The assessment is done according to the combination of modules chosen.

EC verification procedure
Authorisation process



EC verification procedure
Authorisation process



EC Verification procedure : assessment Evaluation module

	+	• -
SH1	• Cheaper (nobo cost) • Faster • Nobo will not participate to tests • Less on site • Ideal for mature organization • Audit for test labs done by the applicant	• Need of a strong design process with a complete documented traceability • Traceability of conformity and additional check on evidences.
SB+SD	• No ENG QMS audit (Even if the Eng QMS is not assessed, need to be rigorous to avoid multiple assessments loops.) • No need of a specific process for TSI evidences • Deeper assessment from the NoBo (NoBo check the complete design activities)	• Risk of more iteration if no evidence check process • More expensive • Test program plan evaluated by the NoBo. • Nobo/Debo will participate in a lot of the tests. • Test Lab audit performed by NoBo

Bombardier choose the SH1 module.

EUROPEAN UNION AGENCY FOR RAILWAYS

The design examination phase

EC Verification procedure : Communication with Belgorail

On a regular basis, BT sent to Belgorail TSIs compliance matrix : evidences linked to the requirements

Réservé BT	Réservé BT	Réservé BT	Réservé BT	Réservé BT	Réservé BT	Réservé BT	Réservé BT	Réservé BT
AN	ID DOORS	Num	Exigences	Description	AN PPD	Description	AN PPD	Paragraphe validant le requis
299		4.2.2.2.4	Rescue coupling					
300	STI-MR-2011-REQ-0015	4.2.2.2.4.0-1	At the ends of units not equipped with any end coupling feature, or equipped with a coupling system which is not compatible with the manual coupling system as per clause 4.2.2.2.3 of this TSI, provisions shall be made to enable the recovery of the line in case of breakdown by hauling or propelling the unit to be rescued:	- Plan d'ensemble attelage de secours	8505			
						Rapport d'essai de type secours en ligne - utilisation de l'attelage de secours	8532	CC:Tout le rapport V200: Mod1L: IDF:
				Spécification d'essai de type secours en ligne - utilisation de l'attelage de secours	8610			
				Notice de fonctionnement attelages	8663			
				Dossier CI_STI MR GV: Attelage secours	85301			

The audits of the Quality Management System

EC Verification procedure : SH1 module

Application of SH1 Module : Activity of the NoBo Belgorail

- Design Examination:
  - BT QMS Audits : 5 days for project and design audit during design phase
  - TSIs Compliance check : Design and Test Evidences verification

- Production and Final Testing :
  - BT QMS Audits :
    - First autorisation : 3 days for manufacturing
    - QMS certificate renewall : 2 days every two years

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Compiling the files

- Content of the Authorisation File compiled by the Applicant
- Presentation by EPSF

Contents of the Safety file (DS)
And of the APIS

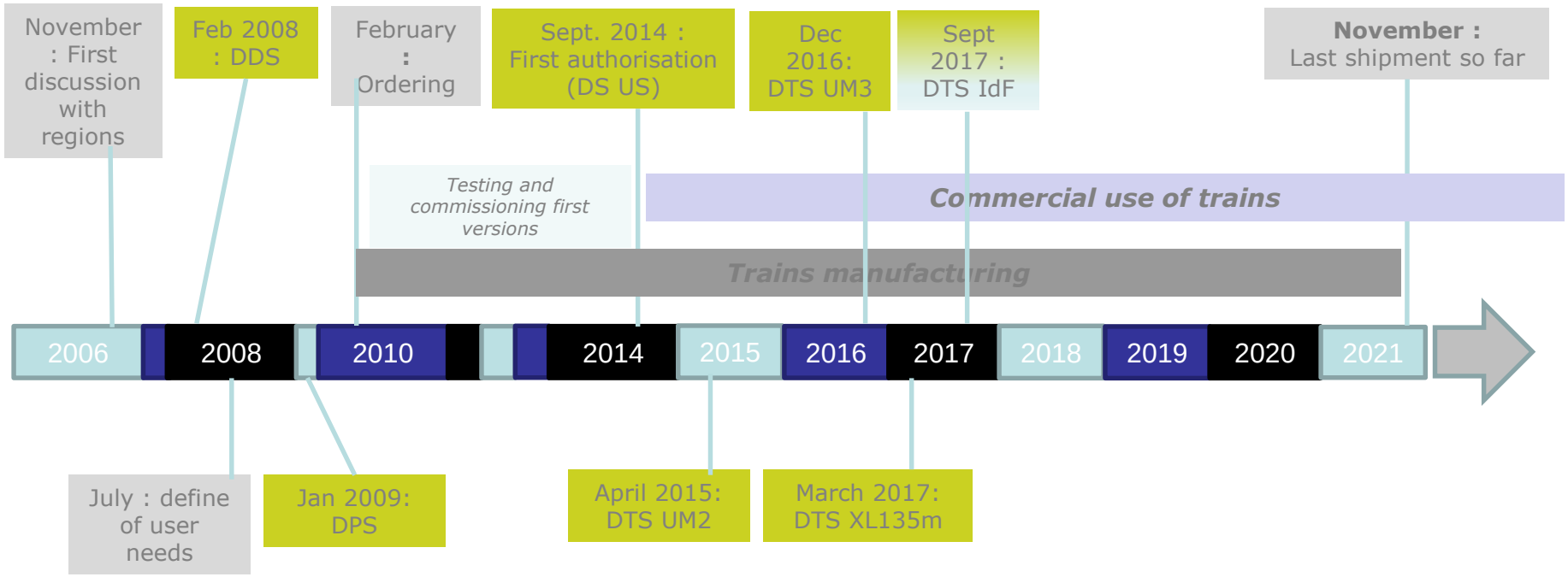
ERA Training in Budapest (Regio2N) – 28th of June 2017

APIS (Autorisation for placing into service)

AMEC (autorisations de mise en exploitation commerciale) de véhicules

Schedule of the project

- 341 trains ordered so far, out of the 860 possible in the contract



The contents of the Safety file (DS)

a) A Technical report,

b) Status on tests,

c) The Operation manual & Maintenance Plan,

d) The declaration of the applicant relative to DCS,

The declaration of the applicant relative to CSM RA,

e) The CE declaration and its technical file,

f) The CSM RA report.

The contents of the Safety file (DS)

a) The Technical report :

- Vehicle description,
- Applicable requirements applied,
- Description of innovation and / or specificity of the project
- Description of différences with the Dossier de Conception de Sécurité (pre-engagement file)

b) Status on tests :

- Tests results, expert opinion, test lab recognition,
- Clause to clause with the national rules (DRN)

The contents of the Safety file (DS)

c) The Operation manual & Maintenance Plan

- List of the exported constraints,
- Operation manual containing information needed for RU to operate the vehicle,
- Maintenance plan,
- Rescue information: conditions for rescues, lifting, rescue services,
- etc…

The contents of the Safety file (DS)

d) Applicant declarations :

- that all risks identified in the DCS are covered,
- and Project complies with:
  - ✓Technical and safety rules,
  - ✓Pre-engagement file (DCS) including NSA prescriptions.

e) The CE declaration, acc. to Appendix V of Directive 2008/57, that must contains :

- restrictions and conditions for use,
- TSI list & List of the documentation of the Technical File

The contents of the Safety file (DS)

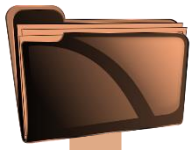
f) Organisme Qualifié Accrédité (OQA) Report on the Authorisation file « Dossier de Sécurité »

As defined in art 13 of arrêté of 23 juillet 2012, the report (in accordance to provisions of CSM) concludes with :

- ✓ Compliance of the project with technical and applicable safety rule (on the basis of tests and calculations made by the applicant),
- ✓ The validity and completeness of the safety analysis and studies,
- ✓ Risks : assessment of the validity and completeness of documents that are covering the risks.

This report does not address aspects within the NoBo assessment.

DCS



1 month

Verification of the completeness Of the safety file

DS

1 month

4 months

Verification of the relevance and consistency of the safety file

3 months & 2 weeks

Avis

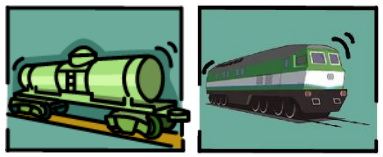
APIS / AMEC

What are the main contents of the Vehicule Type Authorisation ?

- (a) the area(s) of use;
- (b) the values of the parameters set out in the TSIs and, where applicable, in the national rules, for checking the technical compatibility between the vehicle and the area of use;
- (c) the vehicle's compliance with the relevant TSIs and sets of national rules, relating to the parameters referred to in point (b);
- (d) the conditions for use of the vehicle and other restrictions.

A vehicle is authorised for operation if ...

European Register of Autorised Vehicules Types ERATV



APIS (*)
=
Type Authorisation

Individual Authorisation
Of the vehicle

Declaration
of conformity
to the type

Applicant

Maintenance
documentation

National
Vehicle Register
NRV

Registration /Immatricula

50 87 83-83 023-7

(*) = AMEC : Autorisation de mise en exploitation commerciale

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AFTER THE AUTHORIZATION

THE ROUTE COMPATIBILITY CHECKS

EPSF commercial operation authorization give the “big” conditions of compatibility from the rolling stock with the infrastructure, but SNCF Réseau (Network) need :

+ to check in detail witch track can be used and give the potential restrictions (speed, load, …)
+ adapt if necessary some part of the infrastructure

COMMERCIAL OPERATION PREPARATION

To be able to operate the rolling stock, SNCF Mobilités (Passengers) need to :

+ Update the documentation for exploitation :
  - User guide for drivers
  - User guide for people from SNCF who prepare the train
  - User guide for people from SNCF who escort passengers in the train
  - User guide for maintenance

+ Form the drivers :

+ Prepare the maintenance (begin before the commercial operation authorization)
  - Adapt or develop new installation
  - Form the maintenance operators

+ SNCF Mobility need too answer at EPSF condition of performance in line request in the commercial operation authorization (for example the REX for the new technology used of the train

The story of the project
After the authorisation

Contents

- Authorisation
- Monitoring
- Monitoring dedicated on Regio2N

Authorisations

Follow-up the topics raised in the authorization assessment of the two following cases :

- Time limited conditions for use of the vehicle and other restrictions because the conformity to the TSI(s) and/or national rule(s) **cannot be completely proven** before the issuing of the authorisation;

- condition that needs **performance in line** to be demonstrated on a certain period of time.

Monitoring

The general purpose of monitoring is to:

- Make sure that the conditions set forth in the safety management system under which the authorisations were granted are still being fulfilled;
- Assess the safety levels implemented by the authorized entities;
- Anticipate potential safety problems.

Monitoring on Regio2N

AUDIT REGIO2N – JANUARY 2016

The main topics being evaluated were about :

Maintenance (Pole Ingénierie + Technicentre Bretagne) :

Conception of the maintenance rules & Setting of Maintenance Documentation;

Taking into account of the « exported to maintenance » constraints and restrictions raised in the safety file (DS);

Internal Survey;

Return of Experience from Maintenance to Ingeneery/Conception Dpt

Driving (Etablissement Traction Bretagne) :

Use of the « exported to driving » constraints raised in the safety file (DS);

Use of the rolling stock, and follow_up;

Return of Experience from Driving to Ingeneery/Conception Dpt

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Regio2N certification

This checking of compliance to homologation standards was a continuous and structured work sanctioned by Gates with SNCF, DBO and No Bo

- Concept Design phase
- Preliminary Design phase(3D drawings release)
- Detailed phase (2D drawing release)
- Design proofs release
- Test proofs release

Main takeaway and recommendations from Regio 2N experience

- This structured methodology enabled us to obtain certification at the first trial
- It is fair and comfortable to be assessed on the same rules (TSI)
- This method and available design and test proofs are an asset for the authorisation of derivative products
- Applicable authorization requirement baselining is key to certification efficiency
- TSI deployment is not satisfactory yet, only the open points from TSI should remain specific and local
- BT strongly recommend the global application of TSI package 2014

Making the railway system work better for society.

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