

Capacity KPIs and visualisations

Deliverable	3.4 & 3.5 Overview capacity process, TTR perspective
Date	28.09.2023
Version	1-00

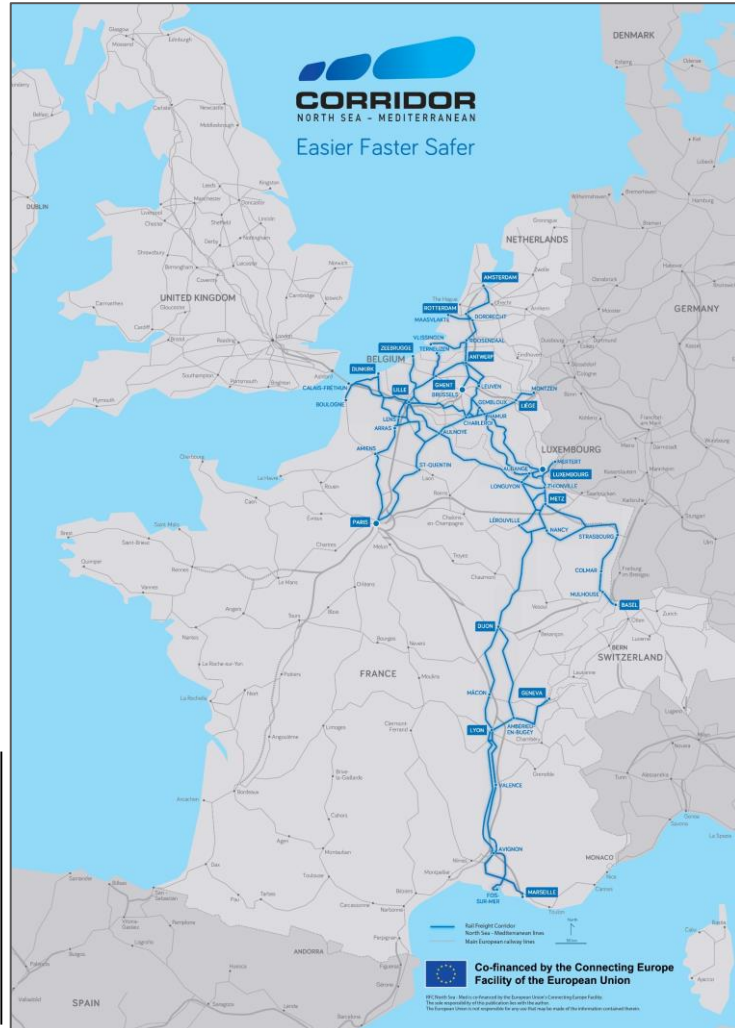
Project governance

Name	Entity	Role
Le Floch Yann	RFC2	Project leader
Chassagne Rébecca	SMA	Project manager
Pelte Kathleen	ACF	Steering committee
Vanbeveren Thomas	Infrabel	Steering committee
Urbain Pierre	SNCF Réseau	Steering committee
Forster Pol	CFL	Steering committee
Stauffer Floraine	TVS	Steering committee

Agenda

1. Context, scope, goals and methodology of the study
2. Assumptions
3. National processes overview
4. TTR convergence goals
5. Process for a major timetable change
6. Proposals for improvements including capacity KPIs and visualisations
7. Annexes

Presentation of RFC North Sea-Mediterranean (RFC2)



Source : RFC2 website

Rail Freight Corridors deals with the organization of capacity for freight traffic at an international scale.

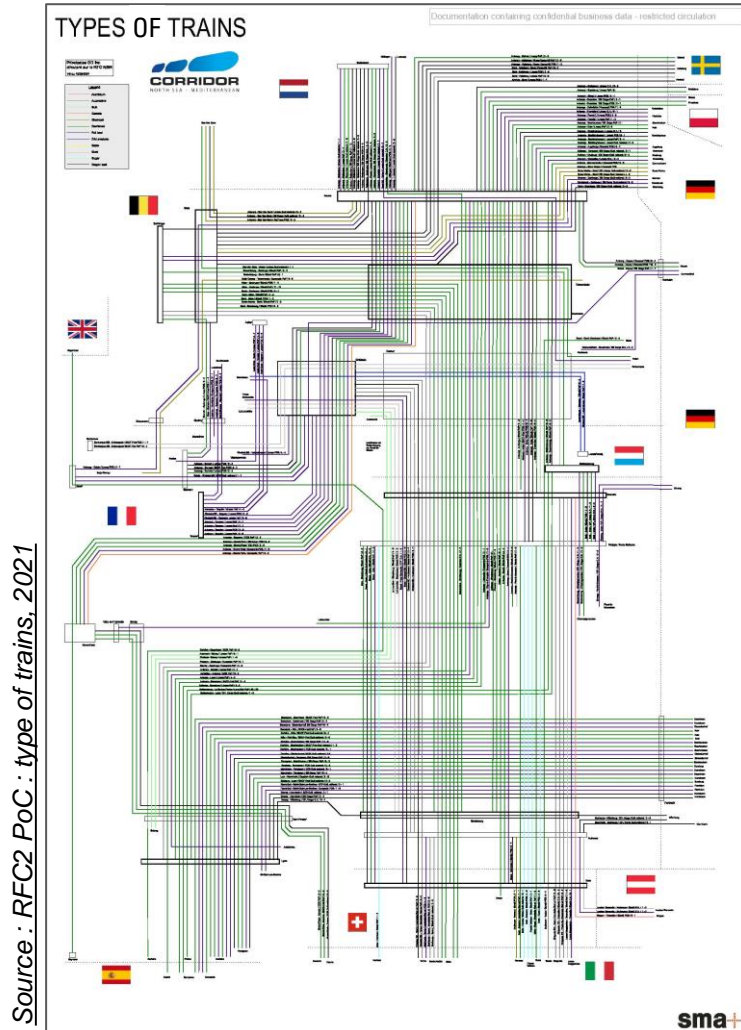
Primary functions

- To coordinate IM's in order to elaborate pre-arranged international path for freight trains and to administrate the RU's requests for those PaPs,
- To facilitate the international coordination process on TCRs.

Additional production functions to monitor train performance and to launch problem-solving processes where the RFC identify low quality in terms of performance.

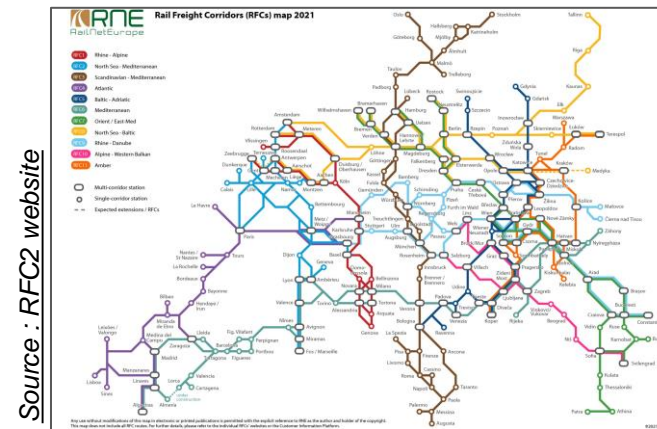
Additional support functions : to manage legal, financial and communication matters related with the administration of the RFC.

Presentation of RFC2



The RFC2 coordinates capacity issues mainly on :

- The Benelux ↔ Switzerland / Italy routes & South of France routes (more than 90% of the Benelux traffic continues to Italy)
- The Germany ↔ Spain routes,
- The UK ↔ Benelux & South of Europe routes,
- The Belgium ↔ North & Eastern Europe routes.



Cooperation takes place with other corridors in order to coordinate appropriately the capacity on multi-corridor routes (RFC Atlantic, RFC Mediterranean, RFC Rhine-Alpine, RFC North Sea Baltic).

Context

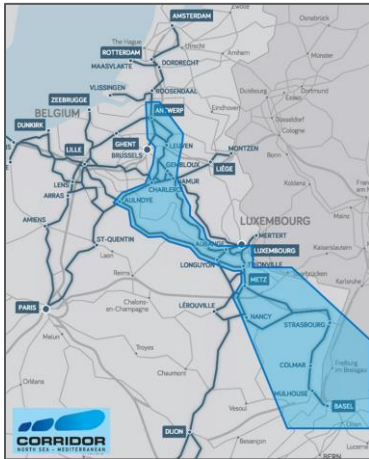
- In the context of climate change, investments need to be done in favour of rail,
- The degraded state of the networks in many regions lead to a lot of works, which have capacity impacts,
- Since traffic does not usually start and end on a specific network exclusively, coordination methods, visualisations, platforms and tools are needed in a way to harmonize the capacity planning and production processes across the borders,
- The stakeholders involved in capacity planning and allocation processes work with a lot of different tools and don't have the adequate cross-border decision-making tools. Capacity KPIs are often not defined, and not calculated/computed. In view of this, there is a lack of transnational view in KPIs and processes,
- RailNetEurope is working on TTR project, which should lead to a big change of the planning processes across Europe, our initiative takes place in this TTR new capacity framework.

The PoC has shown that the import and treatment of trains and TCRs are possible in a single tool, and that the production of capacity KPIs and visualisations is possible with manual or automatic methods. It has also highlighted some hurdles. It is now time to go a step further:

- Apply these methods on real data and larger scale in order to produce results that can lead to real decisions
- Go over the hurdles, especially the ones linked to the processes in order to produce all the capacity visualisations needed
- Work with the different stakeholders on capacity visualisations and help them to understand the differences between their national processes in order to improve the cross-border planning processes of paths and TCRs.

Presentation of the PoC

Goals & steps



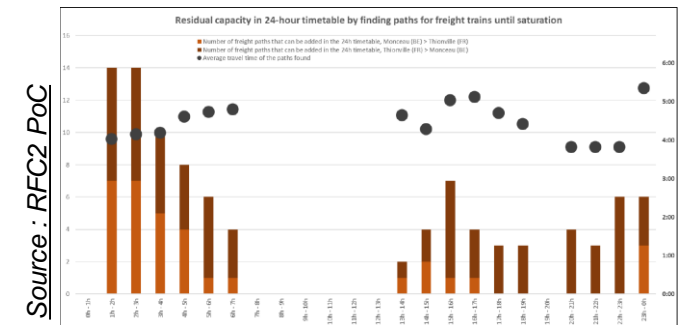
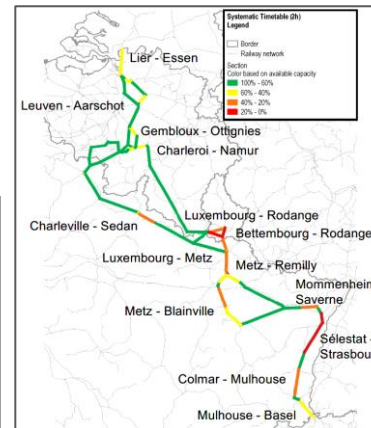
The primary goal was to demonstrate the feasibility of an international freight capacity production process centred around an integrated railway timetabling platform. Highlighting the benefits of such a coordination through original, synthetic and schematic visualisations based on a single database was the main objective.

- Creation of a merged international Viriato database
- Import of 2-hour regular timetables
- Capacity analysis of 2-hour regular timetable
- Saturation by path search in 2-hour regular timetable
- Import of yearly timetables and TCR data
- Capacity analysis of 24-hour timetable
- Saturation by path search in 24-hour timetable
- Production of KPIs and dedicated displays

Results achieved

The creation of a transnational merged database (planned infrastructure, trains, TCRs) is possible but some questions related to the IMs data models were raised. Important differences between planning processes which could jeopardise capacity analyses were highlighted.

Using a database with consistent data at the “appropriate level of granularity” allows to produce KPIs, evaluations and visualisations which support the international harmonisation for trains and works, as well as the understanding of capacity stakes.



Scope of the study



Geographical scope :

- All the French, Luxembourg and Belgium sections of the RFC NSM.
- Additional sections : Mons –Maubeuge section (via the Quevy Feignie border point),
- The Highspeed lines between the BE/NL Border + Eurotunnel border and Paris
- Alternative itineraries will also be considered if needed/required

Time horizons and data considered :

- Infrastructure : topology and signalling performance
- Timetable : paths with timetables (with added times), track line and station track
- TCRs : closures and time penalties

→ 2021, 2022, 2023, 2024, 2025 : planned (different states) and real

Goals

Produce visualisations to understand capacity issues, and on this basis, suggest process improvements to capacity stakeholders.

- What is the **capacity currently available** ?
- How can the capacity be **increased** in the future ?
- What are the capacity **issues** (where, how much, what kind) ?
- How to **increase** capacity in these points ? How far ?
- How to create a capacity **transnational database** and use it ?
- Are there any **issues** in the capacity **processes** ?
- How can the **decision making process** about capacity be improved ?
- How can stakeholders manage a major **timetable change** ?

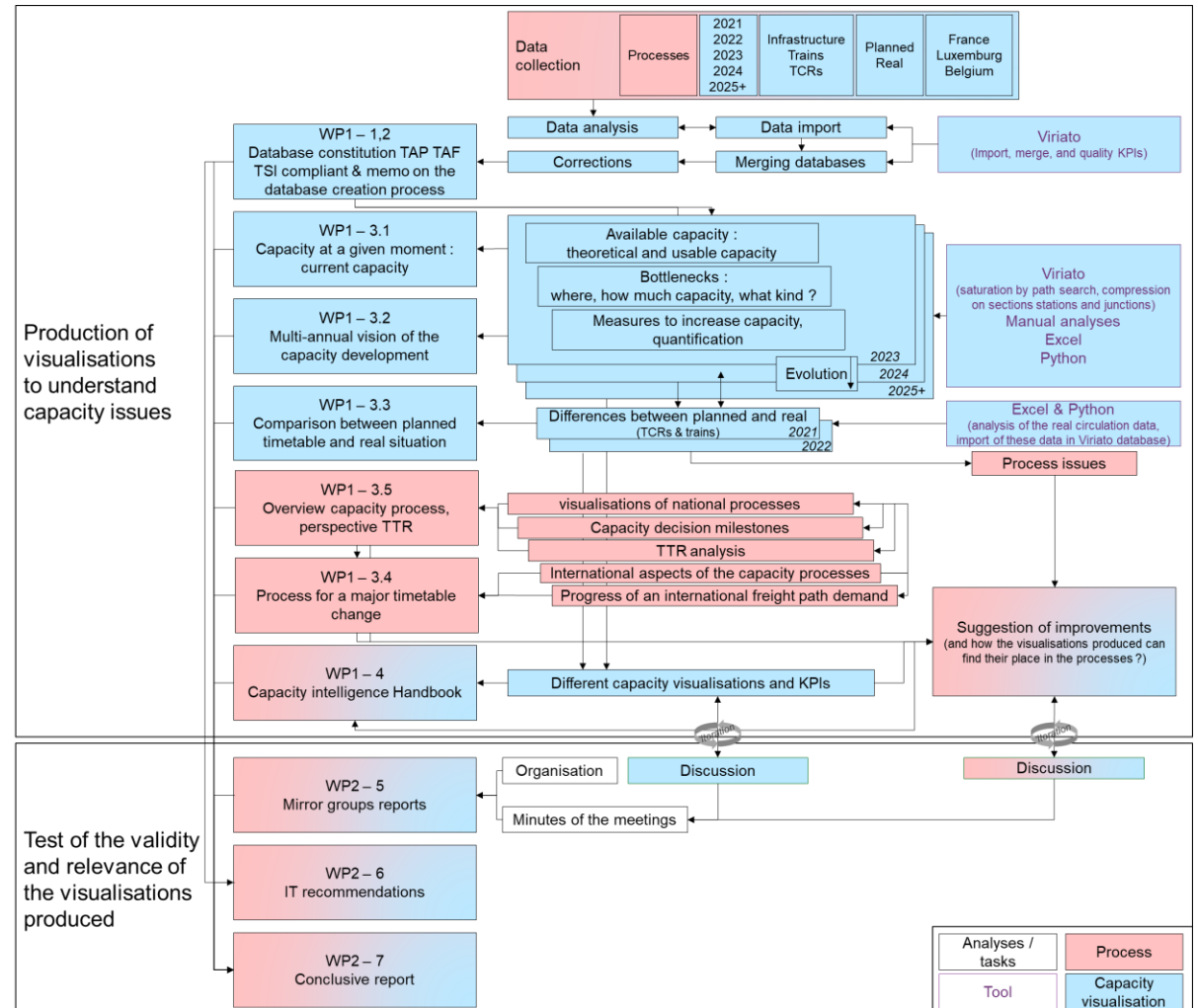
Go further than the PoC

- Work on **official** complete data,
- Add the import and analysis of the **real situation** data,
- Go further on the **365 days** analysis,
- Deepen the analysis on the **stations**,
- Identify some **measures** to have more capacity,
- Quantify the **additional capacity** that could be offered by different **measures**,
- Analyse the processes and the **entire capacity supply** chain, especially the **transnational aspects**,
- **Work with the stakeholders** to improve the visualisations and the capacity processes.

General approach

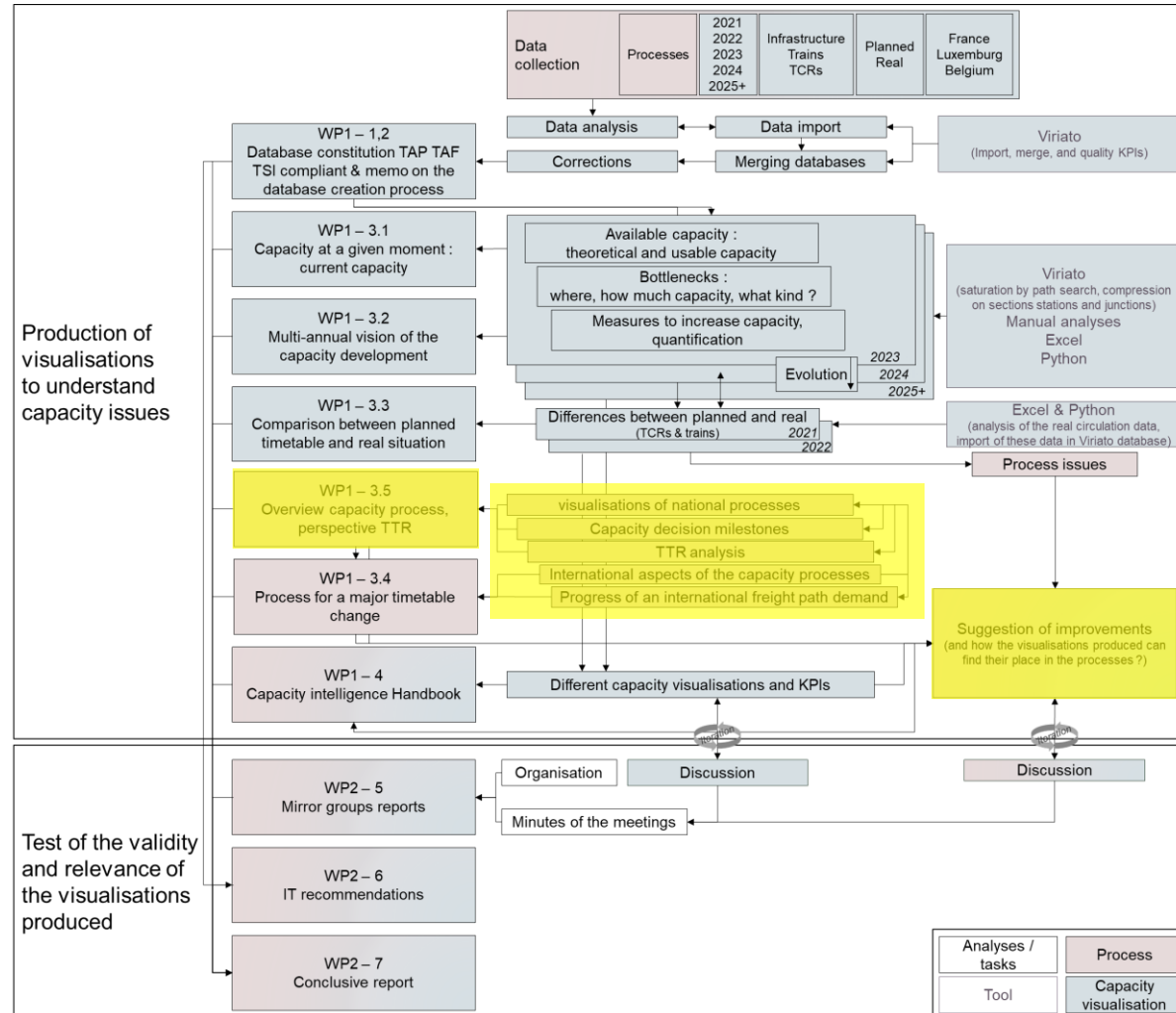
General methodology phases :

- **Collect, analyse and import** infrastructure, timetables and TCRs data of the 3 countries, of real circulation and TCRs, and planned data for short and middle-term in one single Viriato database,
- **Work on capacity KPIs and create visualisations** in order to characterise current and future available capacity, bottlenecks, and identify measures to increase available capacity,
- **Work on processes**, especially transnational aspects,
- **Discuss with the stakeholders** the capacity visualisations and outline how they can find their place in the different processes and make IT recommendations



CONTEXT, SCOPE,
GOALS AND
METHODOLOGY OF
THE STUDY

Deliverable 3.5



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1. Context, scope, goals and methodology of the study
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3. National processes overview
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6. Proposals for improvements including capacity KPIs and visualisations
7. Annexes

Bibliography

- Network Statement (NS) and their annexes for Belgium, Luxemburg and France, for 2024, downloaded from the IMs websites on the January 18th 2023,
- Future process Infrabel (furnished by Infrabel),
- RNE website (and TTR).

Assumptions

- We consider here in the study that the European legal framework has already changed and that TTR is completely possible, in order to propose the TTR milestones as the ones where capacity KPIs can help decisions.

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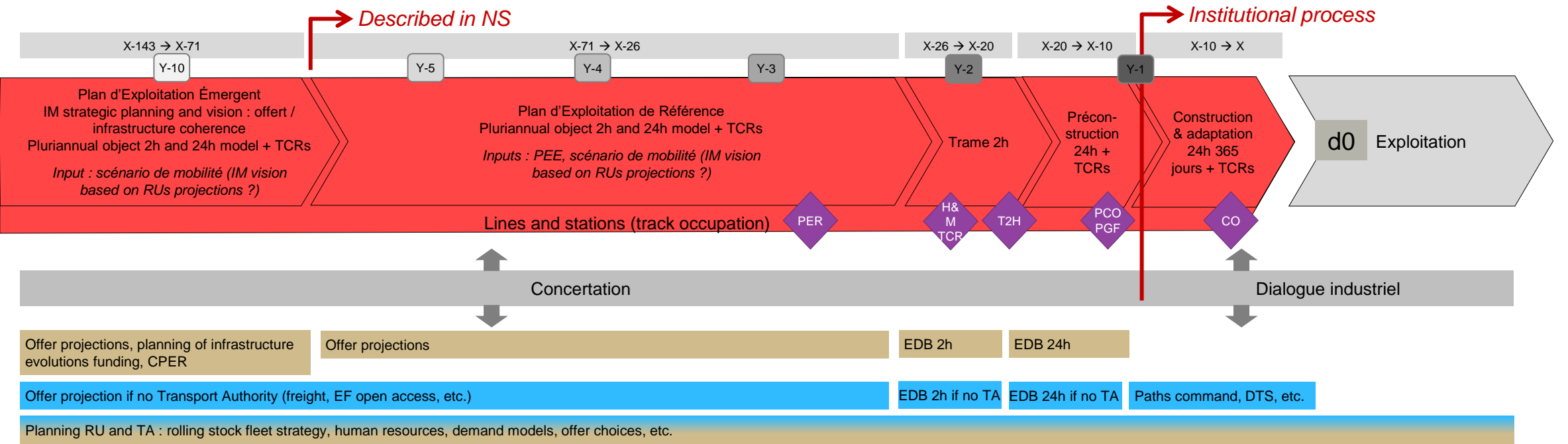
National capacity processes overview

Definitions

- **Institutional process** : beginning of the formal capacity allocation process, which starts a contractual and financial relation between IMs and RUs
- **Described in NS (Network Statement)** : what is clearly mentioned in the Network Statement, what is not described in NS refers to internal process

National French capacity process overview

General national current process overview



Legend

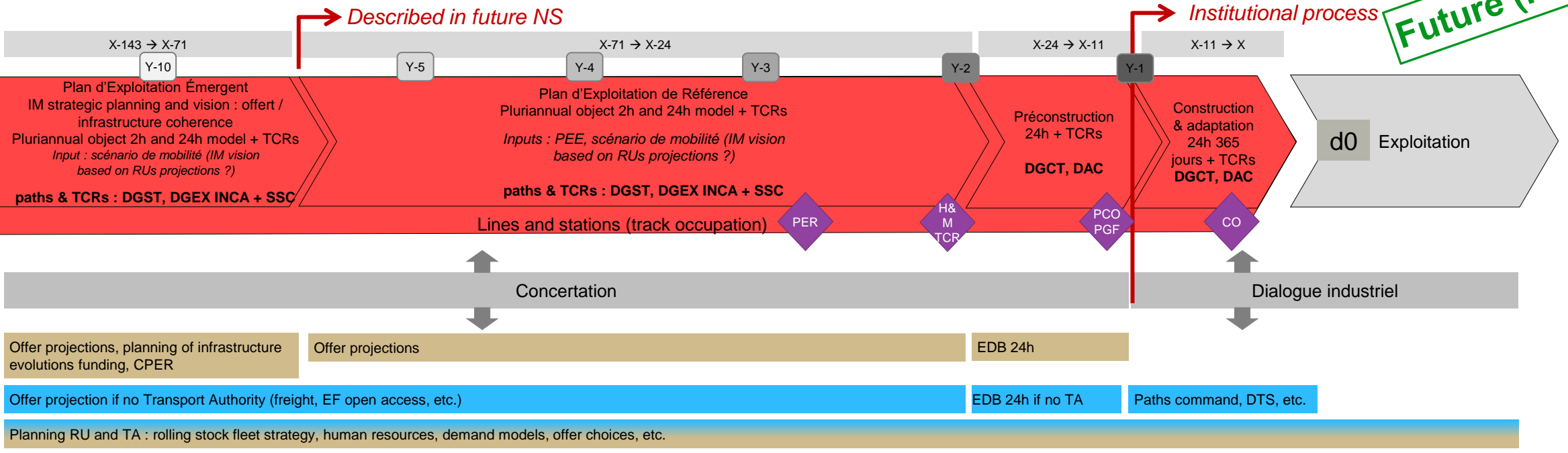
- TA (brown box)
- RU (blue box)
- IM (red box)
- milestone (purple diamond)

National French capacity process overview

General national future process overview



Future (IOS)

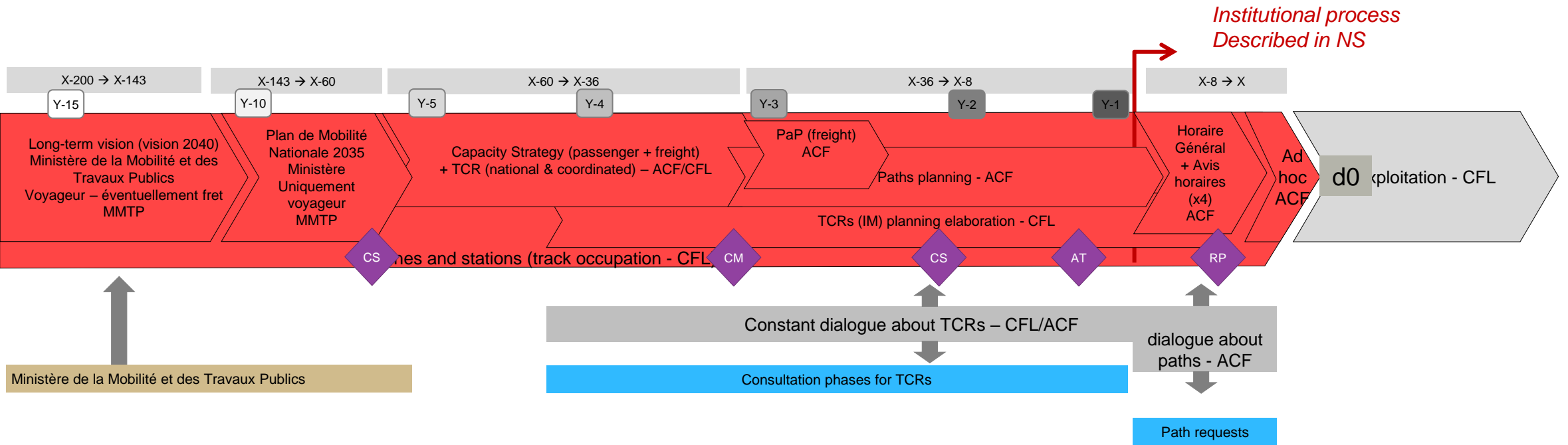


Legend

- TA (tan box)
- RU (blue box)
- IM (red box)
- milestone (purple diamond)

National Luxemburg capacity process overview

General national process overview



Institutional process Described in NS

Legend

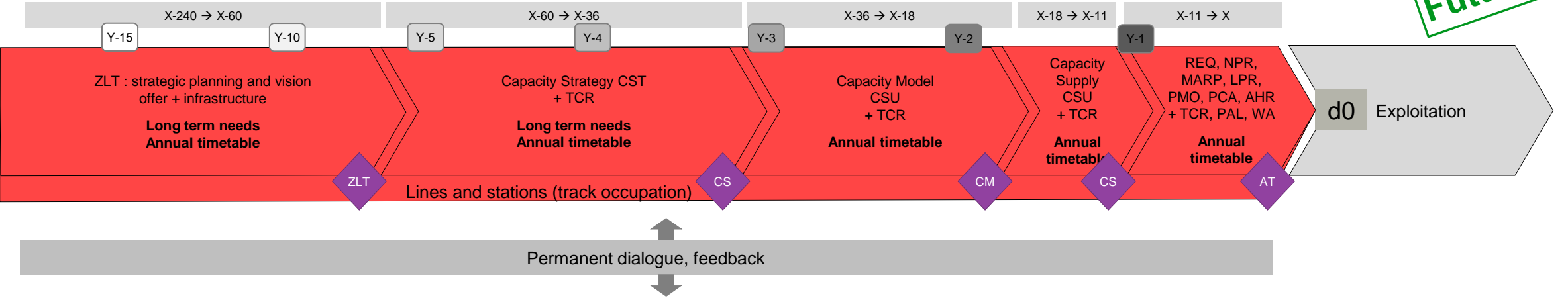
- TA (Transport Authority)
- RU (Rail Undertaking)
- IM (Infrastructure Manager)
- milestone (purple diamond)

National Belgian capacity process overview

General national foreseen process overview



Future



Projections d'offre, choix politiques, lien € ?

Capacity projections | Path requests

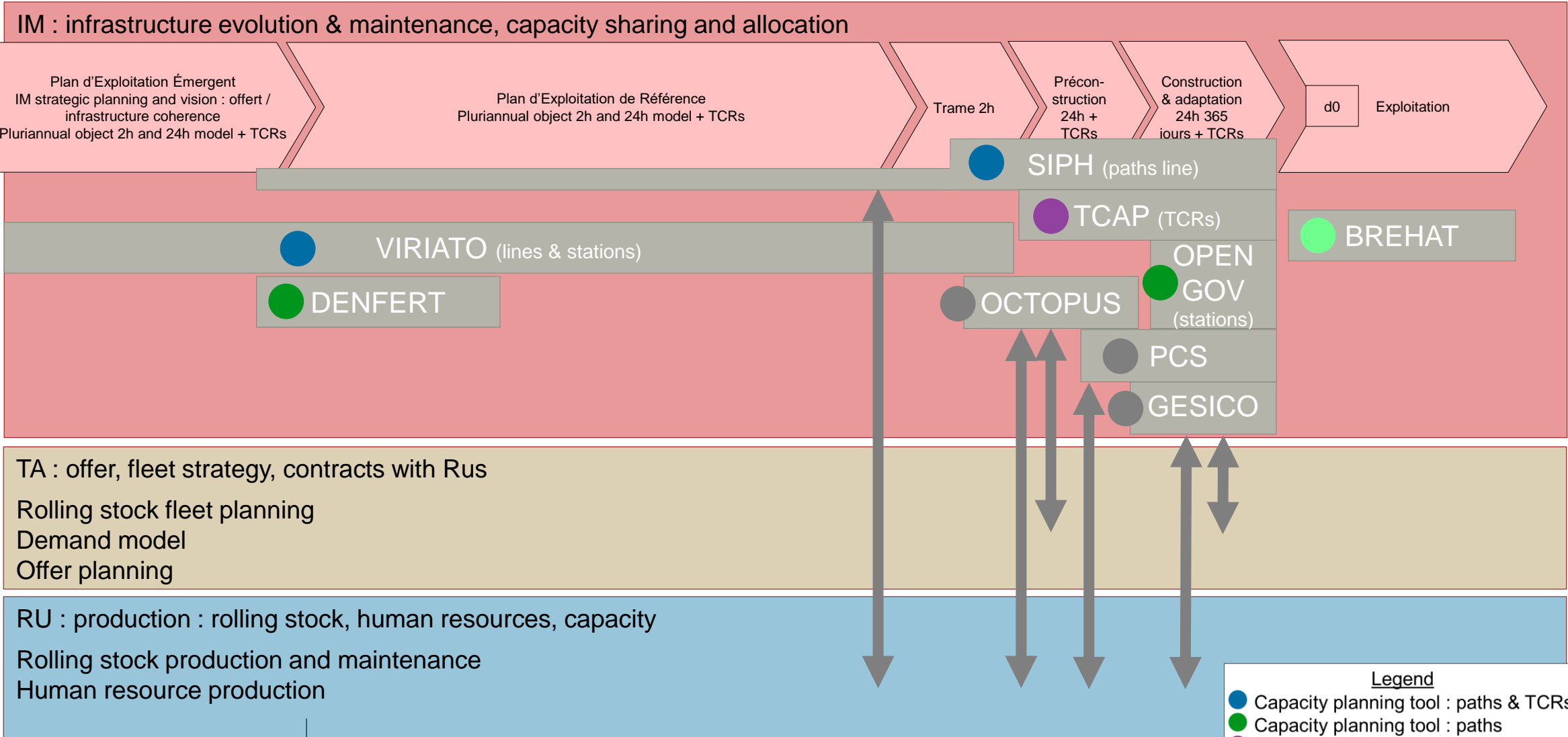
Planning RU and TA : rolling stock fleet strategy, human resources, demand models, offer choices, etc.

Legend

- TA (tan box)
- RU (blue box)
- IM (red box)
- milestone (purple diamond)

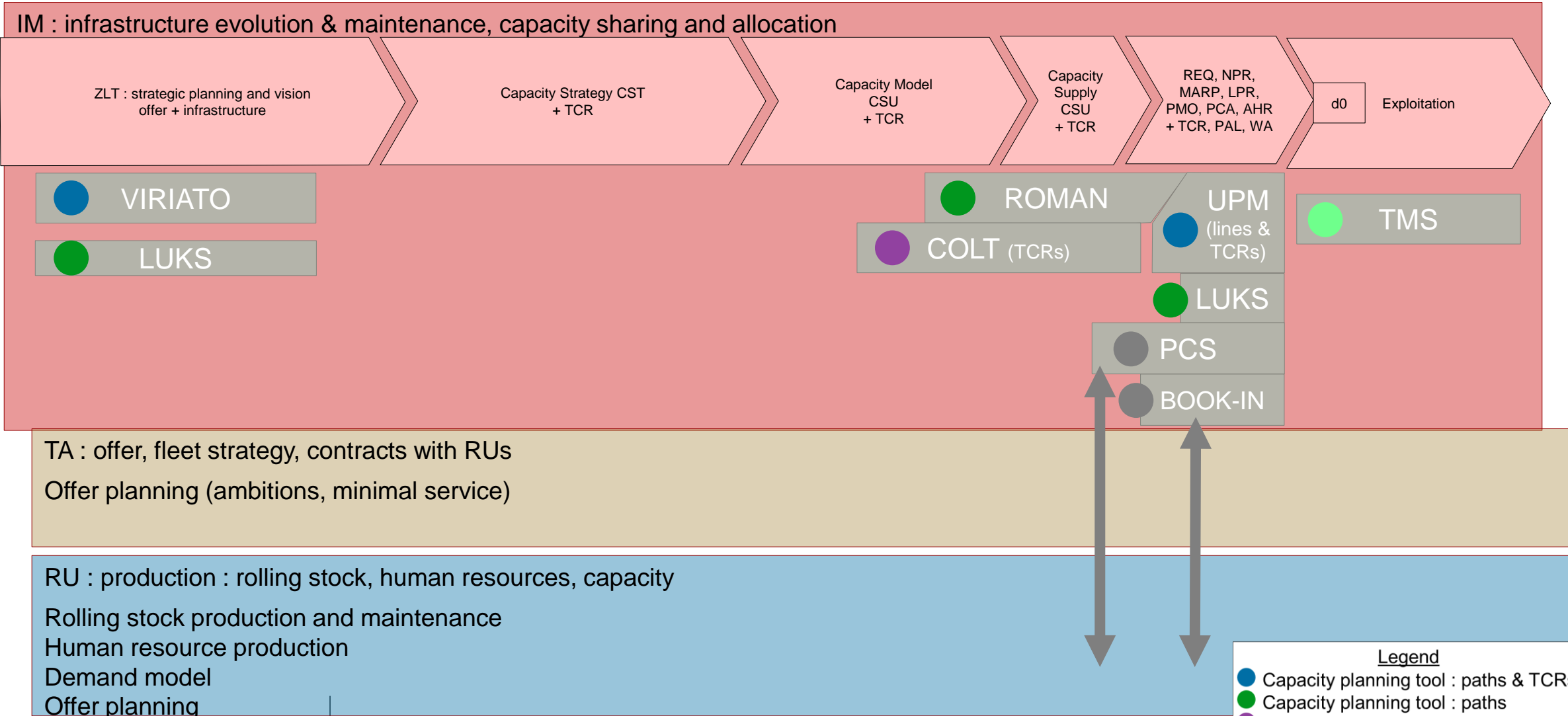
National capacity process overview

Tools in the IM capacity production chain



National capacity process overview

Tools in the IM capacity production chain



Legend

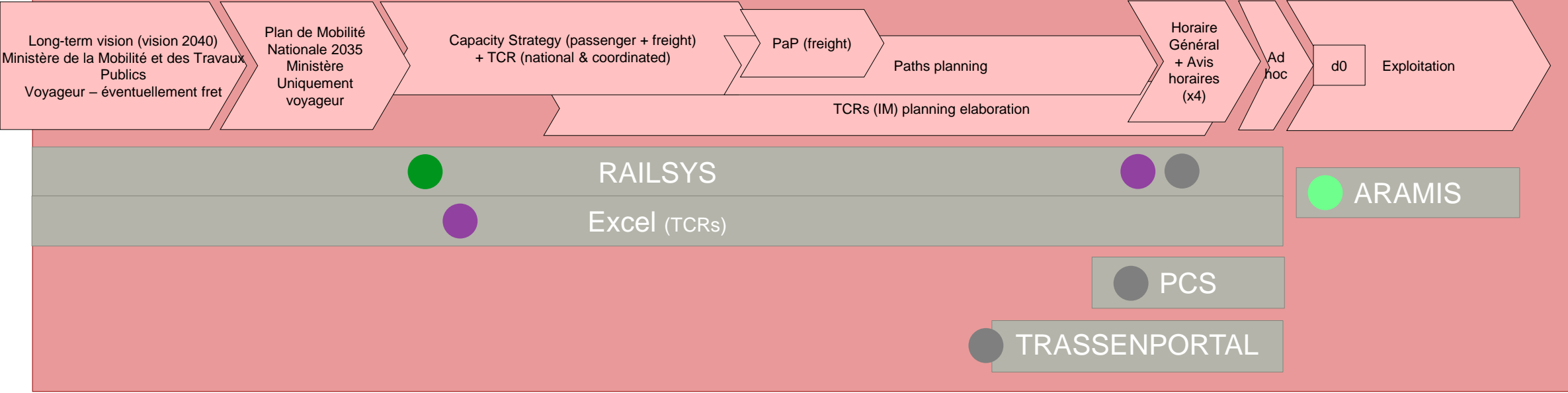
- Capacity planning tool : paths & TCRs
- Capacity planning tool : paths
- Capacity planning tool : TCRs
- Paths requests tool
- Real time : paths

National capacity process overview

Tools in the IM capacity production chain



IM : infrastructure evolution & maintenance, capacity sharing and allocation



TA : offer, fleet strategy, contracts with Rus

Rolling stock fleet planning
Demand model
Offer planning

RU : production : rolling stock, human resources, capacity

Rolling stock production and maintenance
Human resource production

Legend

- Capacity planning tool : paths & TCRs
- Capacity planning tool : paths
- Capacity planning tool : TCRs
- Paths requests tool
- Real time : paths

National capacity processes overview

Official tools in the IM capacity production chain

“Long-term, middle-term, short-term” can have different meanings across countries, as well as “macroscopic, microscopic”.

	France	Belgium	Luxembourg
Capacity allocation short term	SIPH	UPM	RAILSYS ACF
Capacity planning / allocation middle term	SIPH	ROMAN	RAILSYS ACF
Capacity planning long term	VIRIATO – DENFERT – SIPH	ROMAN (Viriato for upstream)	RAILSYS ACF
Station tracks capacity allocation	OPENGOV – SIPH	UPM	RAILSYS CFL
Microscopic dynamic simulation (studies)	DENFERT (=RAILSYS) (OSRD*)	LUKS	RAILSYS ACF
TCRs long term planning	TCAP	COLT	Excel
TCRs short term planning	TCAP	UPM	Excel + RAILSYS CFL
National path requests middle term	OCTOPUS	BOOK-IN	RAILSYS ACF or Trassenportal
National path requests short term	GESICO	BOOK-IN	RAILSYS ACF or Trassenportal
International path requests	PCS		
Real time path measures	BREHAT	TMS	ARAMIS

*OSRD (new tool) in current development

Legend
Microscopic / Macroscopic

Synthesis

- All the 3 processes are currently changing,
- IMs use different tools for strategic network planning, capacity planning, and capacity allocation,
- In FR and BE, work on capacity is splitted into 2 stakeholders groups : long term and short term, but the split is not at the same time, which means that the short/middle term definitions are different, and that the crossed coordination could be difficult,
- In all the 3 IMs, TCRs and paths planning are separated, even if the teams work together,
- The processes are not always precise about the forms that the capacity planning takes, and these differences of approach can be important, for example 2 simultaneous phases can use 2h or 24h timeframe for the capacity planning,
- Milestones are different from an IM to another.

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RNE

- RNE started in 2004 on the initiative of several IMs, who wished to establish a common organisation to facilitate their international business. On February 2023, RNE counts 38 Full Members from over 30 different countries and 11 Associate Members (the RFC),
- RNE facilitates the operational international business of its Members by providing solutions that benefit all RNE Members as well as their customers and business partners. RNE's role is also to provide support as regards compliance with the European legal framework,
- Business areas :
 - Capacity management,
 - Traffic management,
 - Corridor management,
 - IT,
 - Legal matters & sales.

RNE

Which articulation between RNE and this « capacity intelligence » project ?

- RNE deliverables are : processes, handbook, and IT tools,
 - RNE develops tools to support the processes :
 - PCS (path requests),
 - TIS (real time capacity management),
 - TCR tool (publication and coordination of TCRs),
 - ECMT (available capacity visualisation : operational tool),
 - TAF/TAP TSI interface to help the implementation of the TAF/TAP TSI standards
- The approach we develop here is about capacity analysis tools, complementary to RNE capacity production tools.

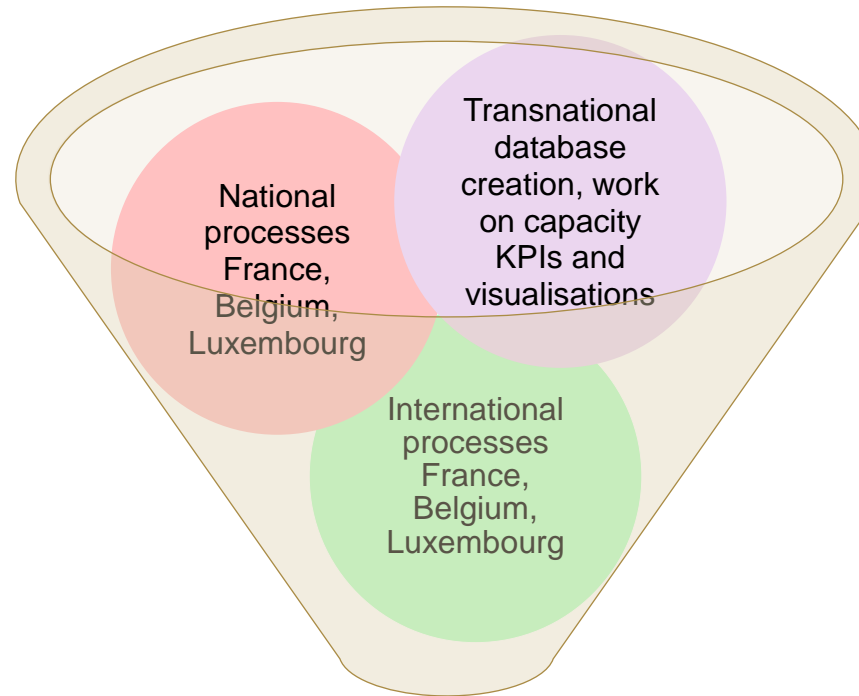
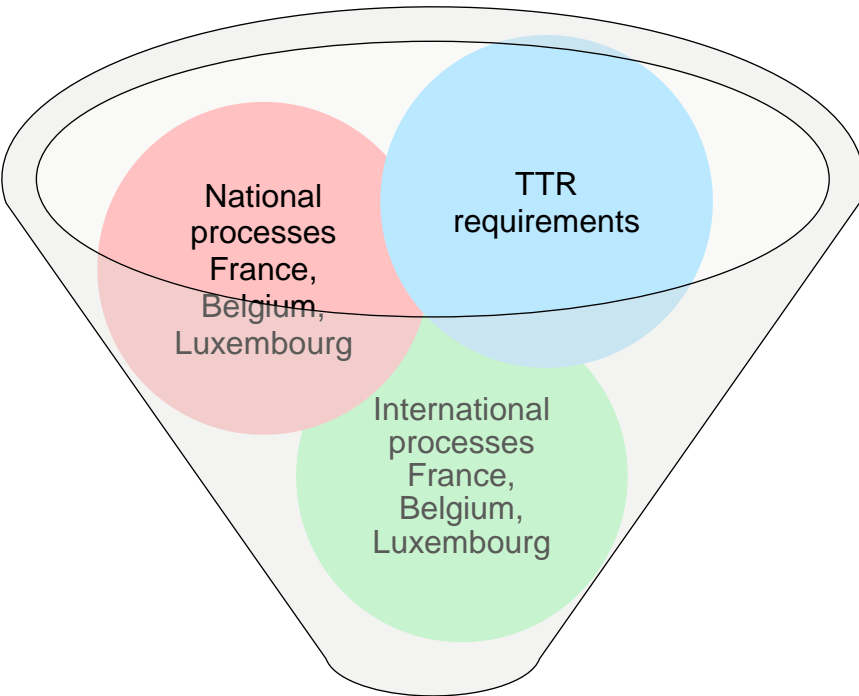
TimeTable Redesign

- Initiative managed by RNE (IMs) and FTE (RUs) to **refund the capacity processes in Europe** : help IMs to **modernise and harmonise** their capacity management, for a better access to paths and for an optimised international coordination for paths and TCRs,
- TTR **is about international and national** paths,
- TTR is a proposed **evolution of the existing processes**,
- TTR proposes a capacity long to short term **process structure**, which can be adapted to national specificities,
- TTR proposes also some **innovative ideas**, such as the rolling planning requests,
- Some national existing processes **already match**, or even exceed the TTR requirements.



TimeTable Redesign and Capacity Intelligence

Which articulation between TTR and this « capacity intelligence » project ?



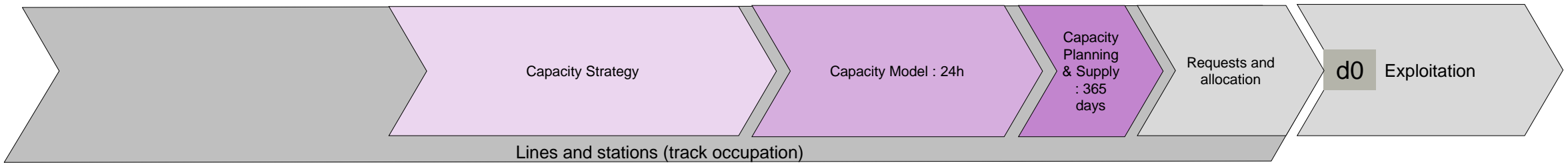
In this study we give a **processes overview**.

Convergence of national processes with TTR requirements is studied by IMs.

Which **capacity KPIs and visualisations** can help the decisions ?

How to produce them ?
How could they be find their place in the current national processes and meet the TTR milestones ?

Proposals for process changes : “enhanced TTR” with insights to help decisions at the TTR capacity process milestones



Capacity Strategy (*Capacity Allocation Strategy*, ≠ network capacity strategy, upstream design of the network)

International coordination : yes
 Deliverable : text describing the vision on capacity : paths and TCRs
 Frame : all network, no special timeframe

Categories:
 High-speed trains
 Long-distance trains
 Regional trains

Freight system paths ATT
 Freight bandwidths for RP
 Unplanned ad hoc

Rather total closers over summer period for major and high impact TCRs

Planning of regular maintenance windows. Only partial closures on lines with not sufficient re-routing options.

Capacity Model

International coordination : yes
 Deliverable : partitioning TCRs / paths in 24h, TCRs year overview
 Frame : all network, 24h, 1 day representing at least 1 year

TCR Capacity		
Total TCR capacity 22 %		
Major impact	12 %	30 days of total closure
High impact	5 %	35 days of partial closure
Medium impact	3 %	5 days half day total closure, 8 days half day partial closure
Buffer-blocks	2 %	Fixed: 4h each Sunday 00-04am Flexible: 7h 1x month: aim - weekend

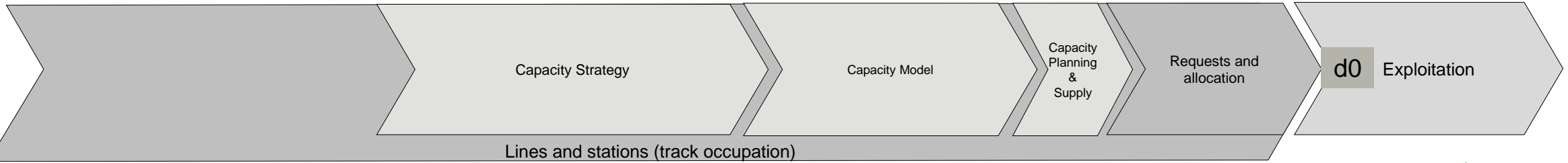
Capacity Planning & Supply

International coordination : yes
 Deliverable : space-time diagram with paths and TCRs
 Frame : all network, 24h, 365 days

TTR : comparison with current process



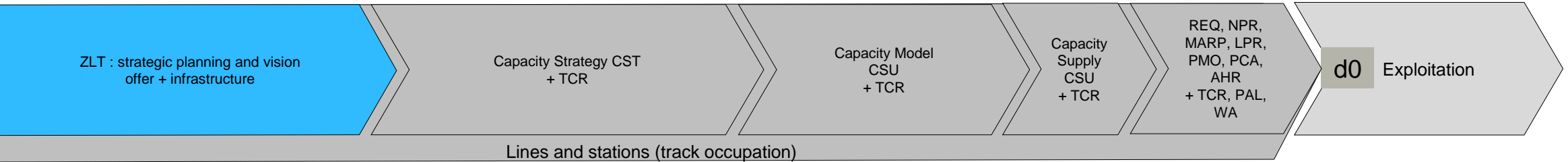
TTR



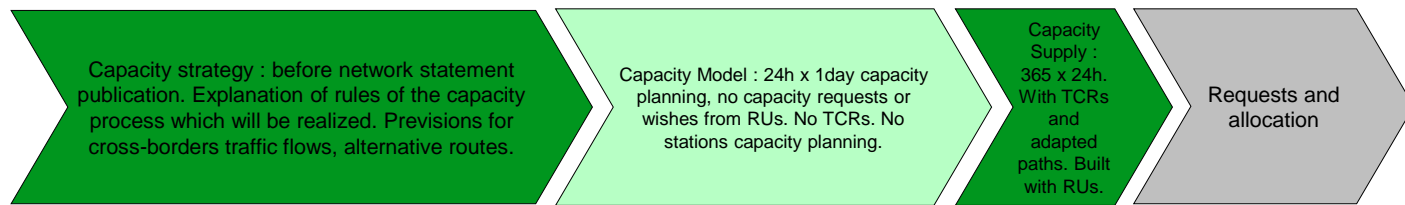
Belgian process



Future



Implementation of TTR



Legend

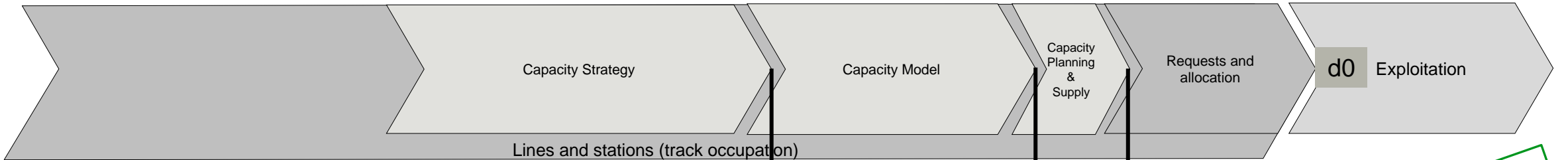
- not achieved
- achieved
- partially achieved
- extra

TTR : comparison with current process



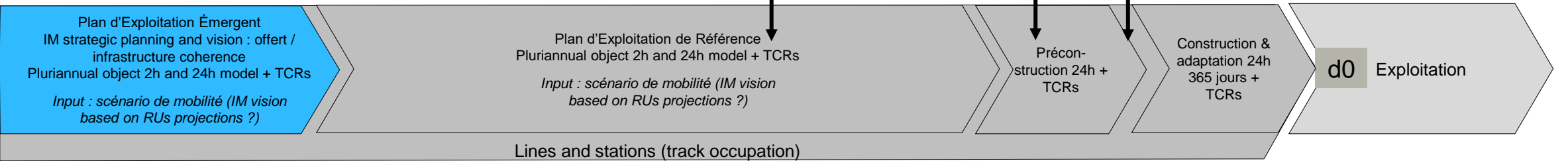
TTR

X-60 → X-36 X-36 → X-18 X-18 → X-11 X-11 → X

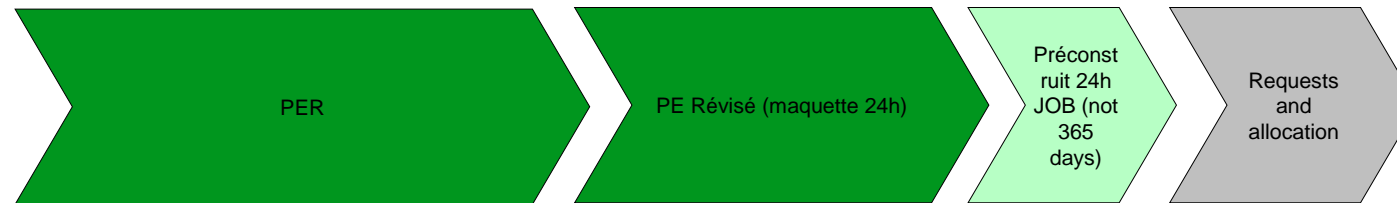


French process

X-143 → X-71 X-71 → X-24 X-24 → X-11 X-11 → X



Implementation of TTR : 1st complete annual service after IOS : 2026

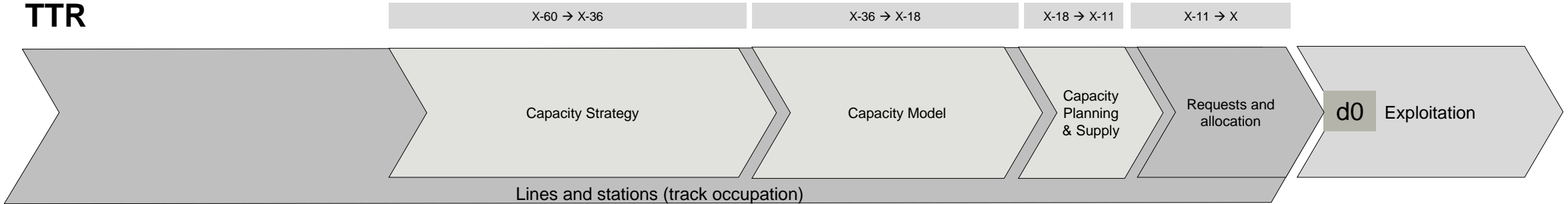


Legend	
	not achieved
	achieved
	partially achieved
	extra

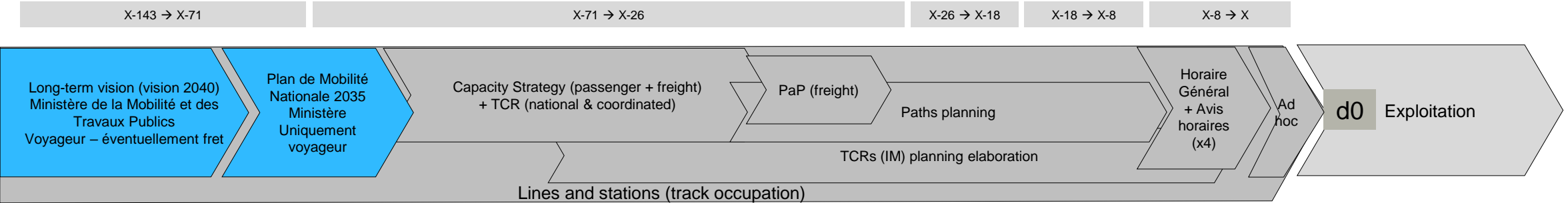
TTR : comparison with current process



TTR

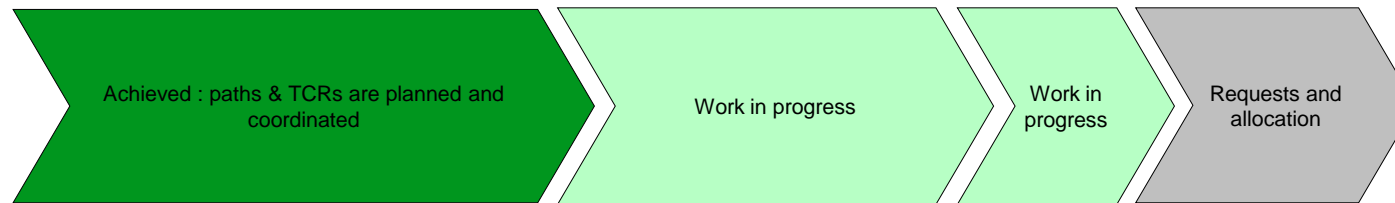


Luxembourg process



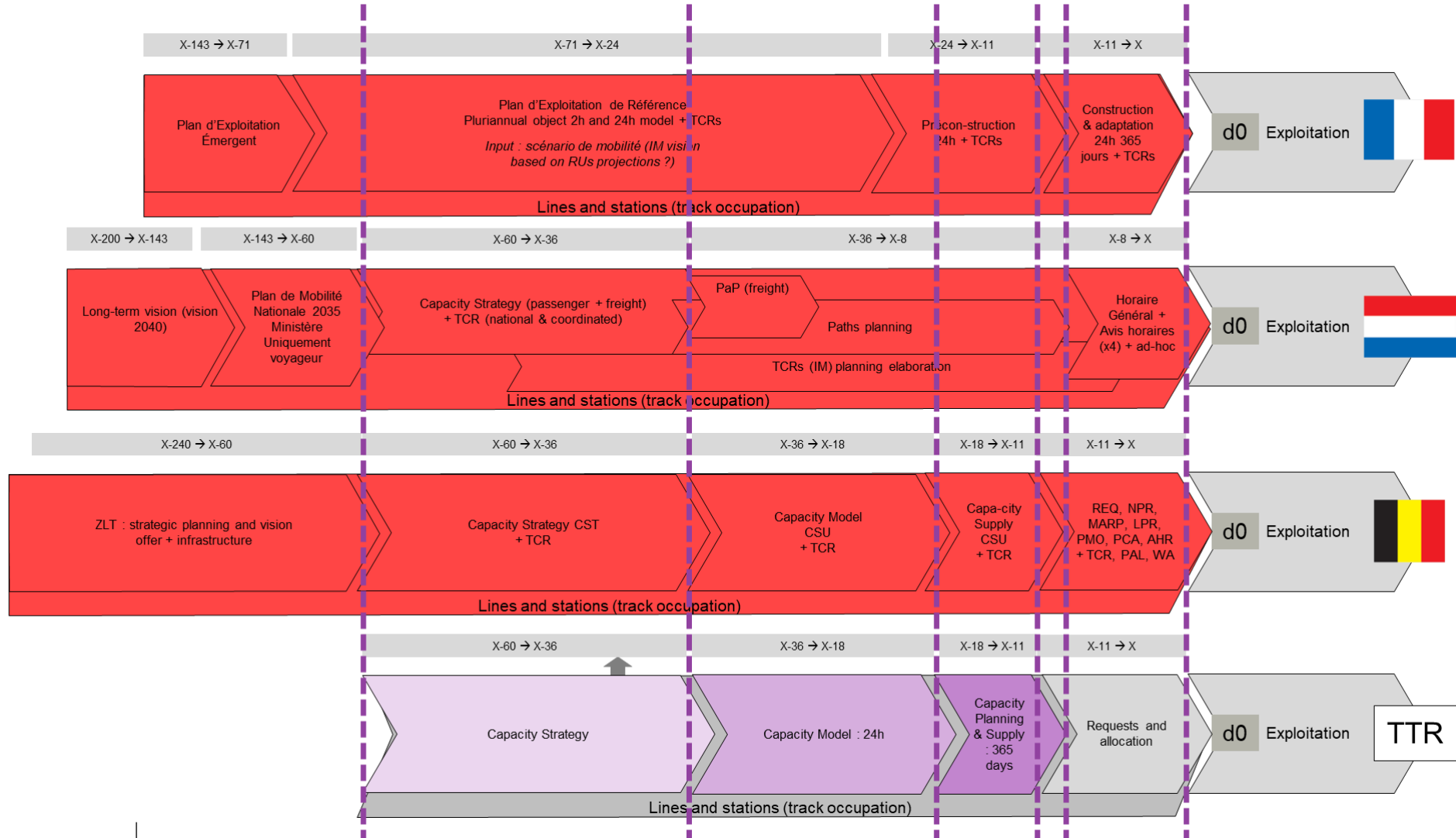
Implementation of TTR

TTR Component	TT 2025	TT 2026	TT 2027	TT 2028
Capacity Strategy	●	●	●	●
Capacity Model (incl. CNA)	○	○	●	●
Capacity Planning	○	○	●	●
Annual Requests	○	○	●	●
Rolling Planning	○	○	○	●
Short Term Request	○	○	●	●
TCR Management	○	○	●	●



Legend
not achieved
achieved
partially achieved
extra

Comparison of the 4 processes



Synthesis

- The 3 processes include a network strategic planning phase, upstream from the TTR phases,
 - Beginning of the 24h x 365 days planning for the annual service to come can be at X-18 (TTR) or at X-8.5 (path requests),
 - Current capacity planning & supply phase is not 24h x 365 days for all IMs,
 - All IMs work on a 24h capacity planning in the timeframe of Capacity Model, but including TCRs is a work in progress.
- Assumption for the study : considering the conclusions of chapter 3, and as TTR is being implemented for the 3 IMs, we will only consider here in our propositions the TTR phases and milestones, for the KPIs propositions.**

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1. Answer preliminary questions

The aim of this chapter is to **design an impact assessment process for a major timetable change** vis-à-vis neighbouring countries.

Here are the **1st questions** to ask in such a situation, and the **assumptions** we take here to design the impact assessment grid.

National processes and milestones

- Where are we in the national processes of the involved countries ?
- Are the national processes able to absorb a timetable change ?
- We consider here that TTR is fully implemented, and we consider a situation occurring before or during the Capacity Strategy phase.

Characterisation of the major timetable change

- Do the major change concerns TCR, paths, or both ?
- Is it for 1 month, 1 year, 5 years, etc. ?
- We consider here a persistent change in the timetable (paths).


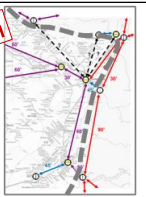
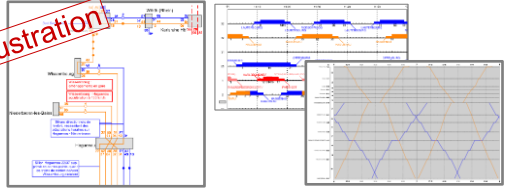
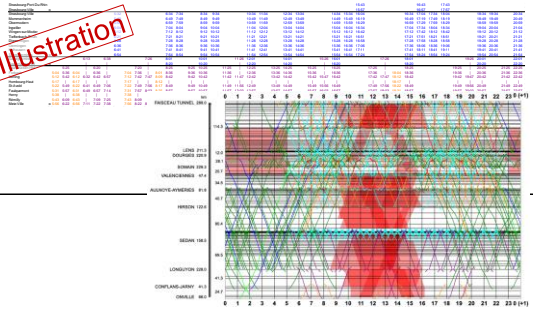
PROCESS OF A
MAJOR TIMETABLE
CHANGE

2. Agree on capacity objects and visualisations

After the preliminary questions, IMs have to agree on the capacity visualisation they will use to **work together** on the timetable.

They have to be precisely defined (see next chapter), to avoid errors linked to the planning culture / usages differences.

The one proposed here are based on a 2h systematic structure.

Phase of the impact assessment analysis	Capacity visualisations	
	Base : 2h systematic structure, that has to be defined : Peak or off-peak ? Minimum number of circulations in 24h to be inserted in the 2h structure ? Empty runs or not ? What kind of trains, of speed restrictions, etc.	
1. Service consistency		Different missions for each train type : high-speed, freight, suburban passenger, etc. Origin, destination, stops of the different missions
2. Timetable structure		Nodes organisation in the network (connections organisation around minute 0 or 15 or 30, etc.) and travel times
3. Systematic timetable		Conflict-free timetable including lines and stations, represented in a 2h systematic netgraph, including frontier (kilometric point to be defined) crossing / stopping times
4. 24h timetable		Conflict-free timetable including lines and stations, represented in a 24h graphic timetable, including frontier (kilometric point to be defined) crossing / stopping times

PROCESS OR A
MAJOR TIMETABLE
CHANGE

3. Build the timetable scenarios

Based on the chosen capacity visualisations, this **technical impact assessment grid** has to be filled by the 2 involved IMs : 1st the initiator IM and 2nd the impacted IM, considering :

- International paths,
- National paths and nodes that have to be changed in the 2nd country.

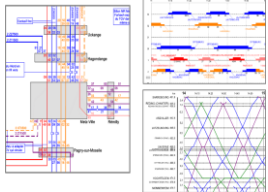
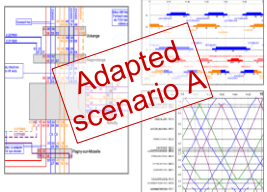
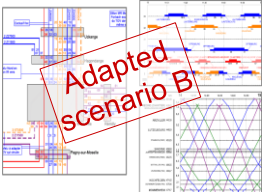
1. Service consistency and 2. Timetable structure have to be studied first, as they are needed to build the different timetable scenarios.

Phase of the impact assessment analysis	Impact KPIs
1. Service consistency	How many missions are cancelled ? How many missions are added ? How many missions are changed (frequency, origin, destination, stops) ?
2. Timetable structure	How many nodes have to be changed in the structure ?
3. Systematic timetable	After the building of 1 or more scenarios which answers all the service consistency requirements What are the differences in the timetable ? What are the differences in the track occupation plans ? What are the differences for the production (trains needed) ?
4. 24h timetable	After the declinaison of the 2h systematic timetable What are the differences in the timetable ? What are the differences in the track occupation plans ? What are the differences for the production (trains needed) ?

3. Assess the impacts on main stakes

The proposed method leads to a simplification of the contrasted scenarios comparisons.

Once the **timetable scenarios** are finished, they can be compared between them and with the **reference**, to evaluate the impacts.

		Reference : current situation	Scenario A	Scenario B
Fill with values and then color according to acceptability of the change				
Passengers : political acceptability	Frequencies		Green	Orange
	Changes in missions (origin, destination, stops)		Green	Green
Freight : RUs and their clients, terminals acceptability	Travel times per mission		Orange	Green
	Connections (and quality of the connection in the track occupation plans)		Green	Green
Passenger : operational costs and efficiency acceptability	Number of drivers needed		Green	Green
	Rolling stock : number of trains needed		Orange	Red
Freight : RUs and their clients, terminals acceptability	Rolling stock productivity		Orange	Red
	Robustness of the timetable		Red	Orange
IMs, RUs, and political acceptability	Malleability of the timetable to changes (train performances, speed restrictions, etc.)		Red	Orange

Agenda

1. Context, scope, goals and methodology of the study
2. Assumptions
3. National processes overview
4. TTR convergence goals
5. Process for a major timetable change
- 6. Proposals for improvements including capacity KPIs and visualisations**
7. Annexes

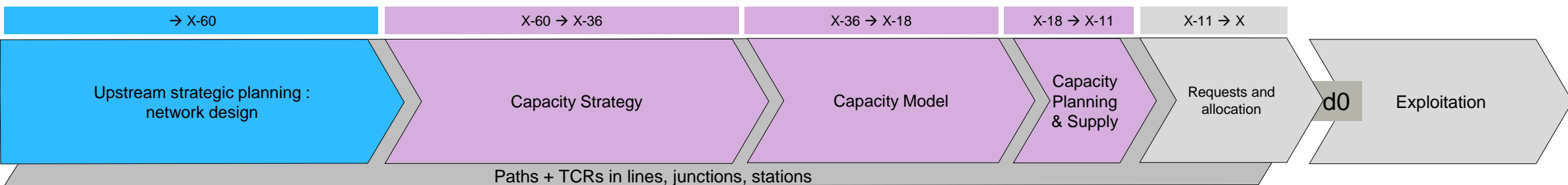
Synthesis of the capacity framework

Assumptions for the study

Steps, tools, and principles of national capacity processes are different. All the processes are changing, to include TTR principles.

→ **We propose to consider only TTR steps and milestones.**

In the next deliverable, we will propose capacity KPIs to help decisions. “How do the capacity KPIs help decisions ?” is a question out of the scope of this study, and refers to the capacity planning methods, which belong to each IM. Here we will answer the question “when do the capacity KPIs help decision”.



Synthesis of the capacity framework

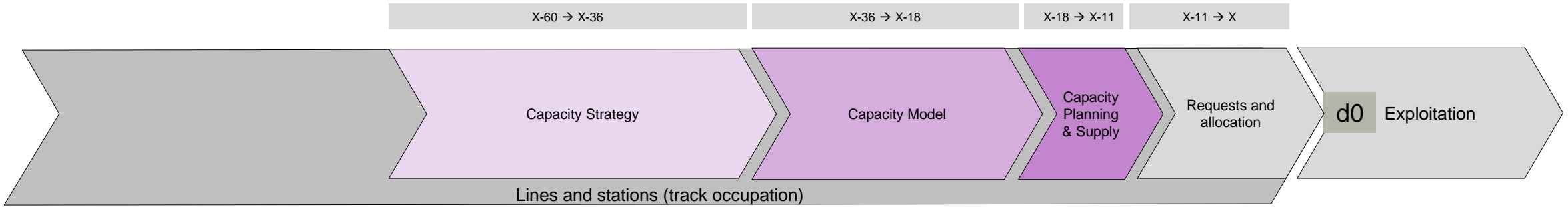
Synthesis of the proposals

Capacity KPIs calculation requires **additional principles to TTR**, to ensure the **comparability of the data across countries** :

- To make the capacity framework converge and allow the building of international databases, **the capacity products** produced by the IMs should be defined more precisely, we propose to participate in the building of a **common capacity language**. *Ex : does the Belgian national capacity planning step corresponding to the capacity model include the stations track occupation plans ?*
- Deliverables of the different steps can't be compared to ensure a feedback on the process. We propose common deliverables. *Ex : Capacity Strategy could be represented as a 2h systematic timetable, if IMs use it, this deliverable can then be updated at every step.*
- A step between the 2h systematic timetable and the 24h timetable (Capacity Model) could be the declination in peak and off-peak hours, especially for freight trains.

Synthesis of the capacity framework

Proposals linked to TTR



Capacity Strategy

International coordination : yes
 Deliverable : text describing the vision on capacity : paths and TCRs + **2h systematic timetable if the IM do the capacity planning on this base**
 Frame : all network, no special timeframe

Capacity Model

International coordination : yes
 Deliverable : partitioning TCRs / paths in 24h, TCRs year overview, **2h systematic timetables for peak and off-peak**
 Frame : all network, 24h, 1 day representing at least 1 year

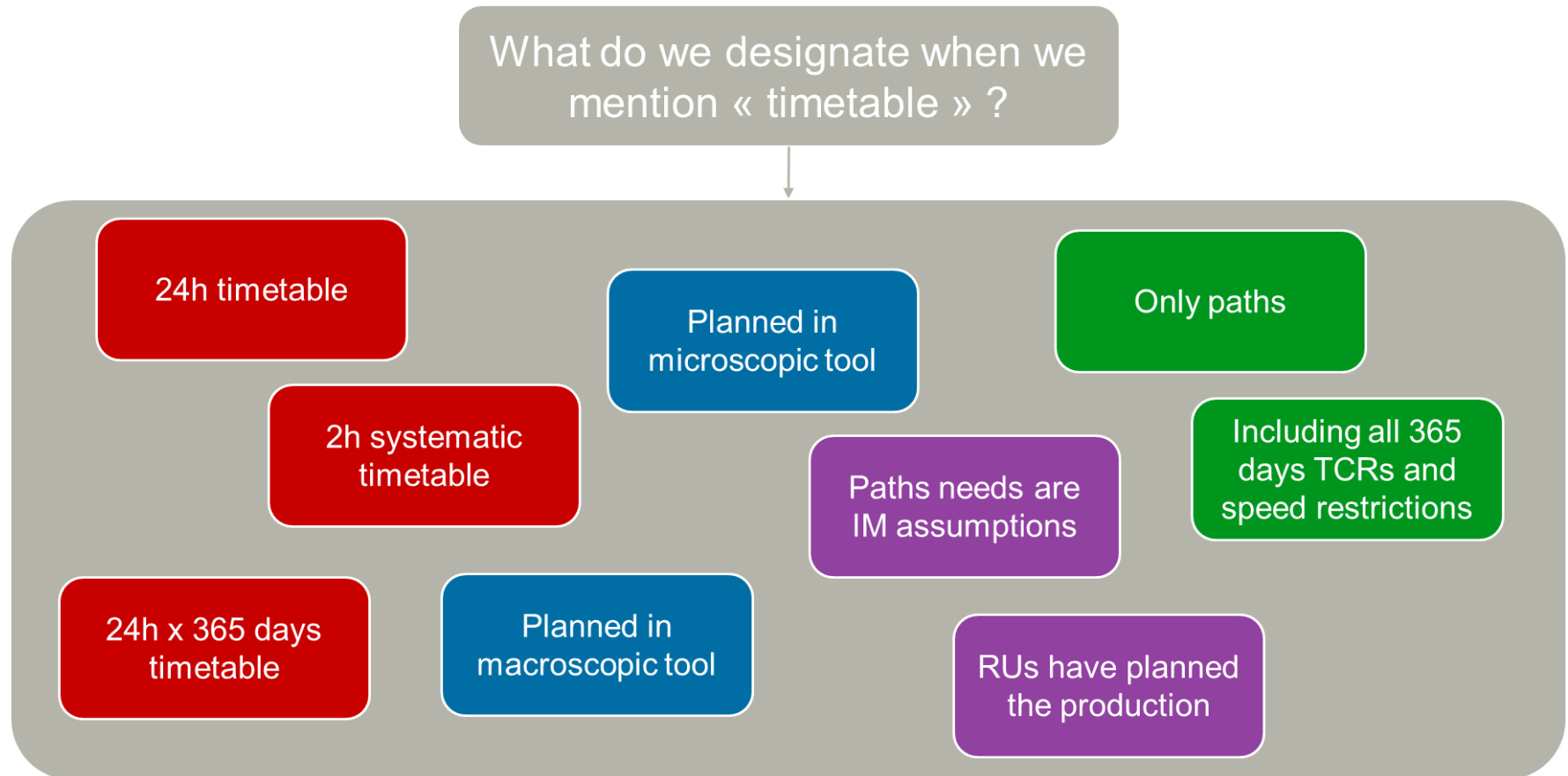
Capacity Planning & Supply

International coordination : yes
 Deliverable : space-time diagram with paths and TCRs
 Frame : all network, 24h, 365 days

Synthesis of the capacity framework

Common capacity language

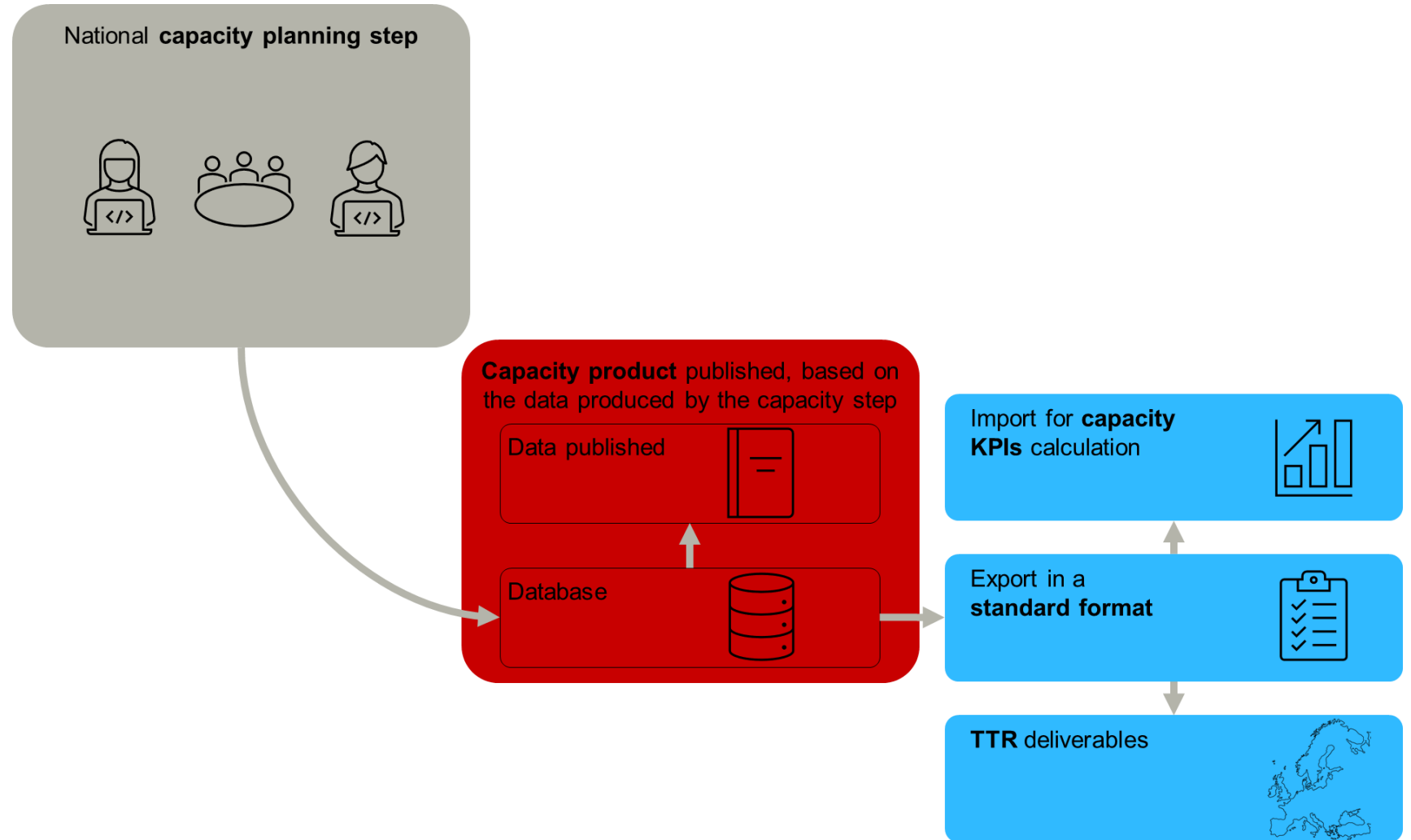
Why do we need a common capacity language ?



Synthesis of the capacity framework

Common capacity language

National capacity planning steps lead to capacity products, including published data and underlying databases, which can be used to produce standard exports, TTR deliverables, and to calculate KPIs.



Synthesis of the capacity framework

Common capacity language

Category	Criterion	Definition of the products
Frame	Time perimeter	1 year, > 1 year, which year(s), etc.
Frame	Geographical perimeter	To be defined precisely
Frame	Geographical perimeter : interactions with other lines considered ?	yes, no
Frame	Before or after the path requests of April Y-1 (X-8.5) ?	aftere, before
Frame	Scale TCRs	2h, 2h peak + 2h off peak, 24h, 24hx365 days
Frame	Scale paths	2h, 2h peak + 2h off peak, 24h, 24hx365 days
Frame	Paths, TCRs, both	Paahs only, TCRs only, both, speed restrictions or not
Frame	Level of precision	macro, mico
Frame	Level of stability (linked to internal or external instability)	high, medium, low
Approach	Tool in which the object is built	Excel, microscopic tool, macroscopic tool, PowerPoint, etc.
Infrastructure topology and performance	Kind of infrastructure topology and signalling performance considered	Current, assumptions, result of a capacity step
TCRs (including speed restrictions)	Kind of TCRs considered	Current, assumptions, result of a capacity step, no TCRs
TCRs (including speed restrictions)	Scope of the TCRs considered	No, major, medium, high
TCRs (including speed restrictions)	Duplicates, overlaps	yes, no
Paths	Track occupation plans	yes, no
Paths	Contains empty runs from rolling stock planning	yes, no
Paths	Level of precision of the characteristics of the paths : locomotive, weight, length, composition	Linked to paths requests, IM assumptions, linked to current, not considered
Paths	Level of precision of the train path	Only a list of stops, complete list of nodes, nodes with track lines, nodes + lines & stations tracks
Paths	Conflicts between paths or duplicates or overlaps and their status (2 requests, alternative route, etc.)	yes, no
Paths and TCRs	Conflicts between paths and TCRs	yes, no
Interactions	Internal IM coordination on paths and TCRs	yes, no
Interactions	Production in RUs planned : drivers, rolling stock	yes, no
Interactions	Status : coordination with entities requesting the paths done ?	yes, no
Interactions	International coordination with other IMs done ?	yes, no
Interactions	Coordination with entities requesting the paths done for the connections ?	yes, no
Interactions	Coordination with entities requesting the paths done for the number of seats offered ?	yes, no

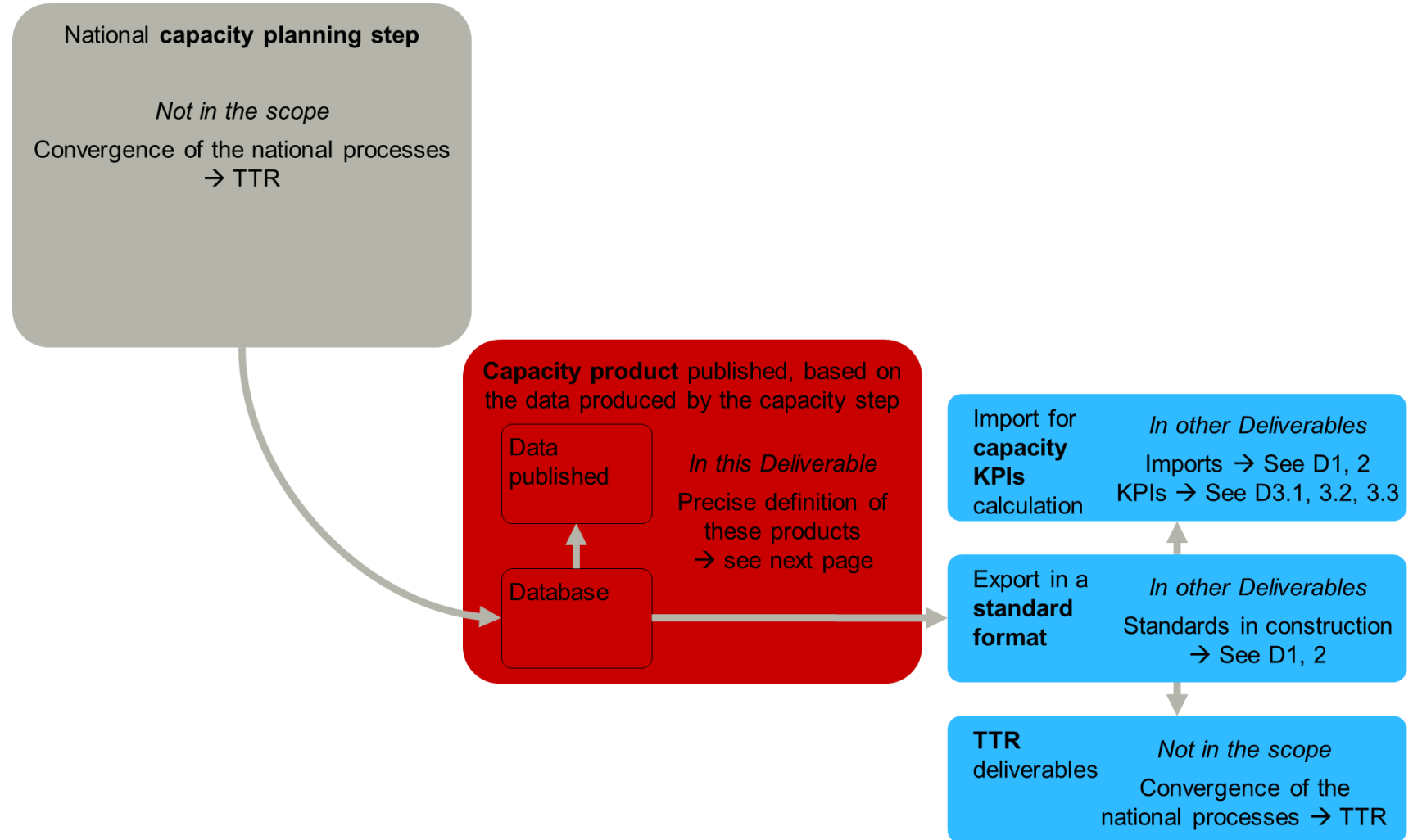
Agenda

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Synthesis of the capacity framework

Common capacity language

How are the different phases examined in this study ?



Common capacity language tool

Example of use

Category	Criterion	Capacity Model			
Frame	Time perimeter	1 year			
Frame	Geographical perimeter	All network			
Frame	Geographical perimeter : interactions with other lines considered ?	yes	no		
Frame	Before or after the path requests of April Y-1 (X-8.5) ?	after	before		
Frame	Scale TCRs	2h	2h Peak + 2h off peak	24h	24h x 365 days
Frame	Scale paths	2h	2h Peak + 2h off peak	24h	24h x 365 days
Frame	Paths, TCRs, both	Paths only	TCRs only	both paths and TCRs	
Frame	Level of precision	macro	meso	micro	
Frame	Level of stability (linked to internal or external instability)	high	medium	low	
Approach	Tool in which the object is built	Excel	Macroscopic capacity tool	Microscopic capacity tool	PowerPoint
Infrastructure topology and performance	Kind of infrastructure topology and signalling performance considered	Current	Assumptions	Result of this capacity step	
TCRs (including speed restrictions)	Kind of TCRs considered	Current	Assumptions	Result of this capacity step	No TCRs
TCRs (including speed restrictions)	Scope of the TCRs considered	No	major	medium	high
TCRs (including speed restrictions)	Duplicates, overlaps	yes	no		
Paths	Track occupation plans	yes	no		
Paths	Contains empty runs from rolling stock planning	yes	no		
Paths	Level of precision of the characteristics of the paths : locomotive, weight, length, composition	linked to path request	IM assumptions	linked to current	not considered
Paths	Level of precision of the train path	only a list of stops	complete list of nodes	nodes with track lines	nodes + lines & stations tracks
Paths	Conflicts between paths or duplicates or overlaps and their status (2 requests, alternative route, etc.)	yes	no		
Paths and TCRs	Conflicts between paths and TCRs	yes	no		
Interactions	Internal IM coordination on paths and TCRs	yes	no		
Interactions	Production in RUs planned : drivers, rolling stock	yes	no		
Interactions	Status : coordination with entities requesting the paths done ?	yes	no		
Interactions	International coordination with other IMs done ?	yes	no		
Interactions	Coordination with entities requesting the paths done for the connections ?	yes	no		
Interactions	Coordination with entities requesting the paths done for the number of seats offered ?	yes	no		

Characteristics fixed by TTR

Free characteristics to fix and communicate with the TTR deliverables

Common capacity language tool

Example of use

Category	Criterion	Capacity Strategy			
Frame	Time perimeter	1 year			
Frame	Geographical perimeter	All network			
Frame	Geographical perimeter : interactions with other lines considered ?	yes	no		
Frame	Before or after the path requests of April Y-1 (X-8.5) ?	after	before		
Frame	Scale TCRs	2h	2h Peak + 2h off peak	24h	24h x 365 days
Frame	Scale paths	2h	2h Peak + 2h off peak	24h	24h x 365 days
Frame	Paths, TCRs, both	Paths only	TCRs only	both paths and TCRs	
Frame	Level of precision	macro	meso	micro	
Frame	Level of stability (linked to internal or external instability)	high	medium	low	
Approach	Tool in which the object is built	Excel	Macroscopic capacity tool	Microscopic capacity tool	PowerPoint
Infrastructure topology and performance	Kind of infrastructure topology and signalling performance considered	Current	Assumptions	Result of this capacity step	
TCRs (including speed restrictions)	Kind of TCRs considered	Current	Assumptions	Result of this capacity step	No TCRs
TCRs (including speed restrictions)	Scope of the TCRs considered	No	major	medium	high
TCRs (including speed restrictions)	Duplicates, overlaps	yes	no		
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Paths	Conflicts between paths or duplicates or overlaps and their status (2 requests, alternative route, etc.)	yes	no		
Paths and TCRs	Conflicts between paths and TCRs	yes	no		
Interactions	Internal IM coordination on paths and TCRs	yes	no		
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Interactions	Status : coordination with entities requesting the paths done ?	yes	no		
Interactions	International coordination with other IMs done ?	yes	no		
Interactions	Coordination with entities requesting the paths done for the connections ?	yes	no		
Interactions	Coordination with entities requesting the paths done for the number of seats offered ?	yes	no		

Characteristics fixed by TTR

Free characteristics to fix and communicate with the TTR deliverables

Common capacity language tool

Example of use

Category	Criterion	Capacity Planning and Supply			
Frame	Time perimeter	1 year			
Frame	Geographical perimeter	All network			
Frame	Geographical perimeter : interactions with other lines considered ?	yes	no		
Frame	Before or after the path requests of April Y-1 (X-8.5) ?	after	before		
Frame	Scale TCRs	2h	2h Peak + 2h off peak	24h	24h x 365 days
Frame	Scale paths	2h	2h Peak + 2h off peak	24h	24h x 365 days
Frame	Paths, TCRs, both	Paths only	TCRs only	both paths and TCRs	
Frame	Level of precision	macro	meso	micro	
Frame	Level of stability (linked to internal or external instability)	high	medium	low	
Approach	Tool in which the object is built	Excel	Macroscopic capacity tool	Microscopic capacity tool	PowerPoint
Infrastructure topology and performance	Kind of infrastructure topology and signalling performance considered	Current	Assumptions	Result of this capacity step	
TCRs (including speed restrictions)	Kind of TCRs considered	Current	Assumptions	Result of this capacity step	No TCRs
TCRs (including speed restrictions)	Scope of the TCRs considered	No	major	medium	high
TCRs (including speed restrictions)	Duplicates, overlaps	yes	no		
Paths	Track occupation plans	yes	no		
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Paths	Level of precision of the characteristics of the paths : locomotive, weight, length, composition	linked to path request	IM assumptions	linked to current	not considered
Paths	Level of precision of the train path	only a list of stops	complete list of nodes	nodes with track lines	nodes + lines & stations tracks
Paths	Conflicts between paths or duplicates or overlaps and their status (2 requests, alternative route, etc.)	yes	no		
Paths and TCRs	Conflicts between paths and TCRs	yes	no		
Interactions	Internal IM coordination on paths and TCRs	yes	no		
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Interactions	Status : coordination with entities requesting the paths done ?	yes	no		
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Interactions	Coordination with entities requesting the paths done for the connections ?	yes	no		
Interactions	Coordination with entities requesting the paths done for the number of seats offered ?	yes	no		

Characteristics fixed by TTR

Free characteristics to fix and communicate with the TTR deliverables

European Union

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