



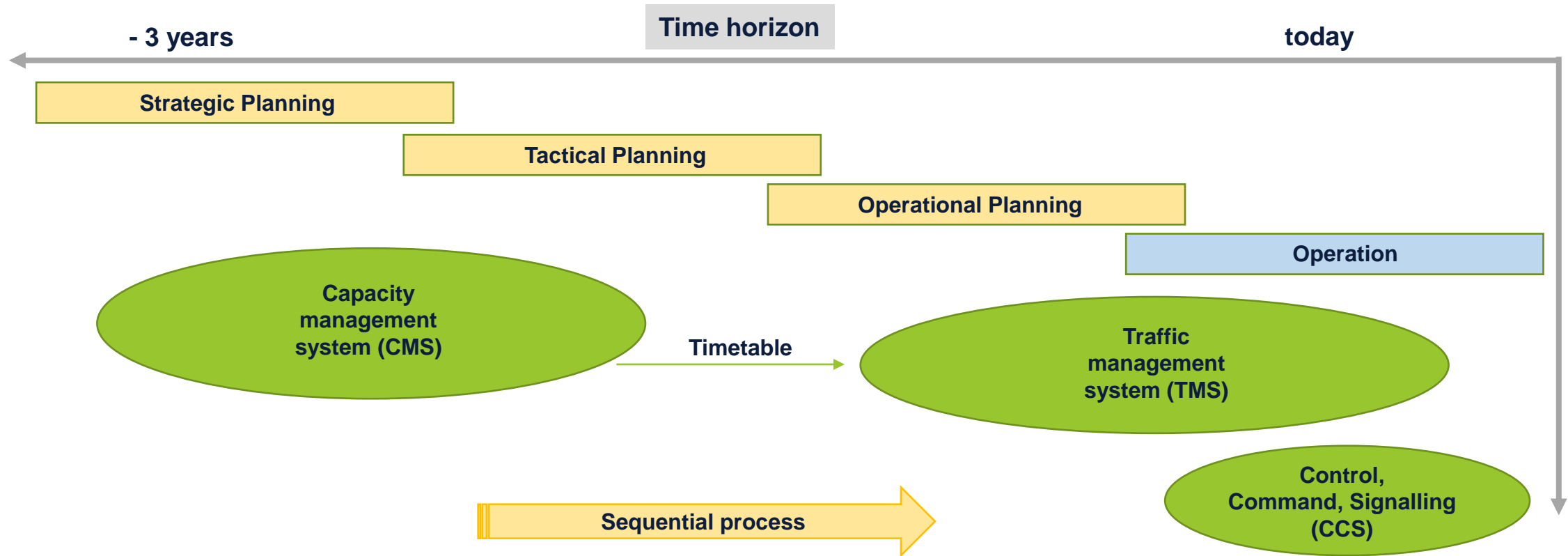
# **The System Pillar innovation for Traffic/Capacity Management System**

**Telematics Expert Groups Plenary**

Frankfurt, 25/05/2023



# Introduction and scope



## Capacity Management Systems

- Network planning
- Optimal capacity allocation
- Prognosis of the service quality
- Variety of different capacity planning methods

## Traffic Management Systems

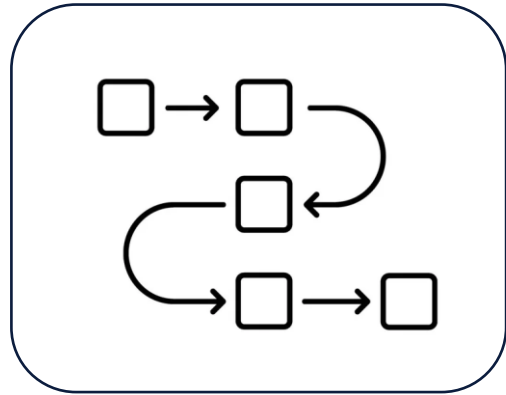
- Permanent control across the network
- Automatically sets routes for trains
- Logs train movements
- Detects and solves potential conflicts.

## Control-Command, Signalling

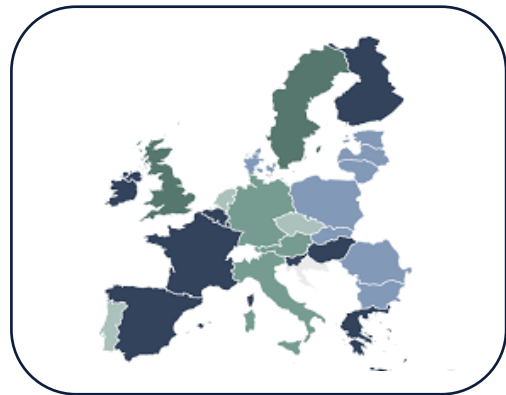
- Safe control of train during operation
- ETCS
- ATO
- FRMCS

# EU-RAIL vision: European, dynamic, real-time TMS/CMS

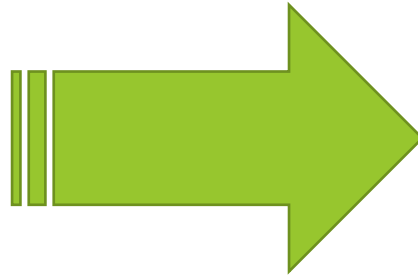
## As/is TMS/CMS in European networks



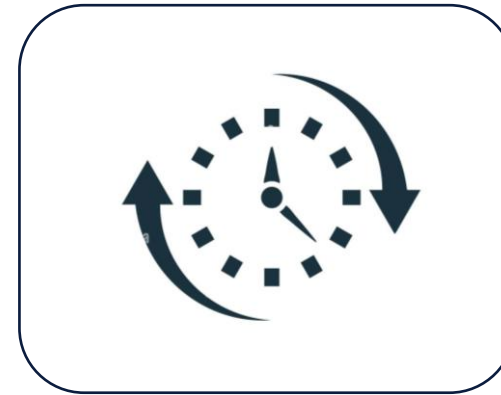
- Sequential, inflexible process



- European fragmentation
- Lack of interfaces and integration

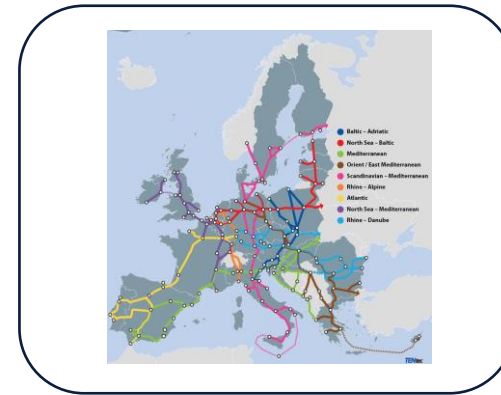


## EU-RAIL TMS/CMS Vision



### Real-Time, Dynamic, TMS/CMS

- Adjustable Operational plan
- Demand responsive TM
- Real-time Deviation detection
- Automation
- Link with TCS and ATO
- Intermodal interface
- Incident impact management



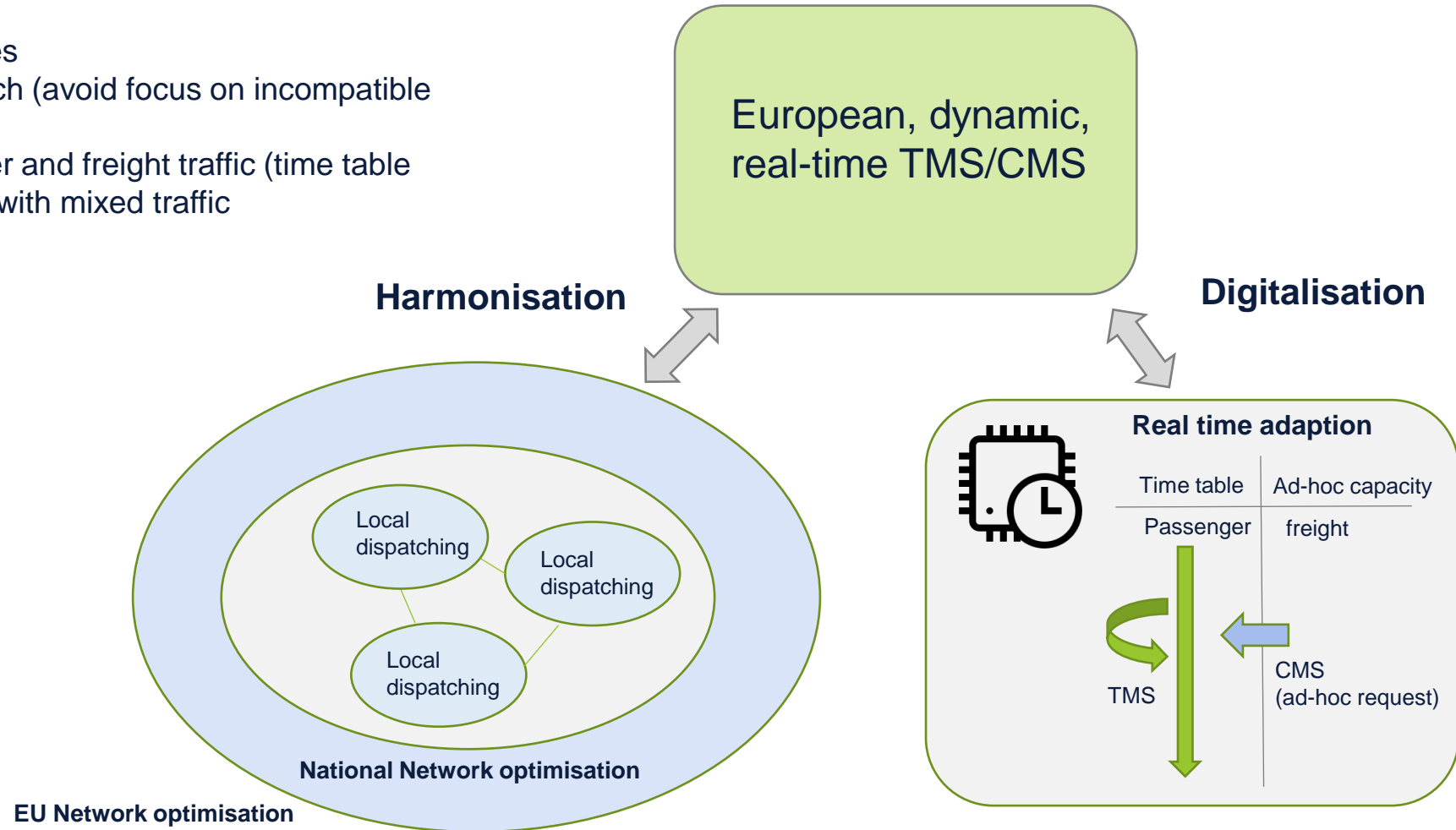
### European TMS/CMS System

- Unified architecture and operational concept
- Different degrees of integration possible
- Digitalisation
- Harmonised Interfaces, technical requirements and operational processes

# EU-RAIL vision: European, dynamic, real-time TMS/CMS

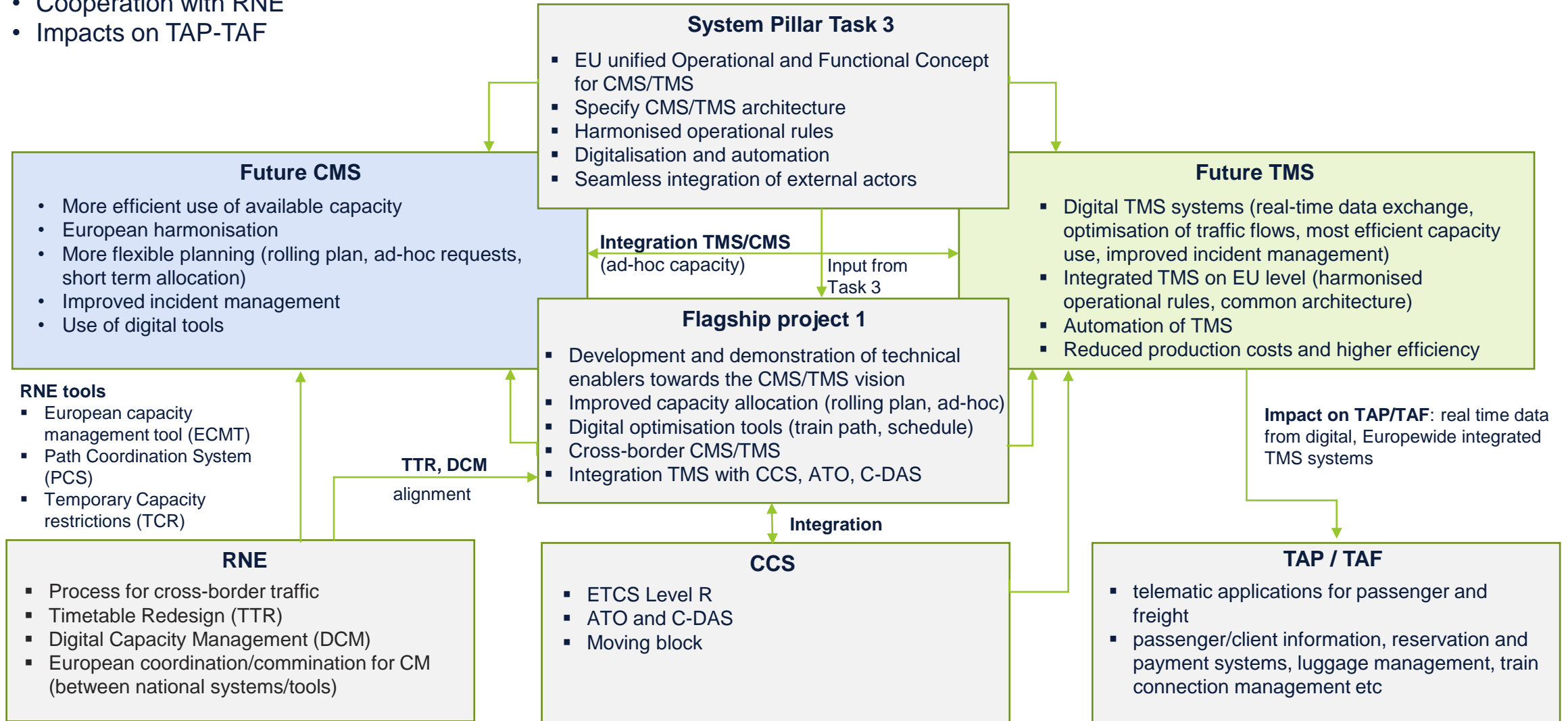
## Future CMS/TMS system

- Integrate Capacity planning and Traffic management (dispatching)
- Real-time adaption of time tables
- Globalised optimisation approach (avoid focus on incompatible local optimisations)
- Optimal integration of passenger and freight traffic (time table + as-hoc requests) in networks with mixed traffic
- Simulation of networks



# Development of future CMS/TMS

- Development in EU-RAIL (SP, FP1)
- Cooperation with RNE
- Impacts on TAP-TAF

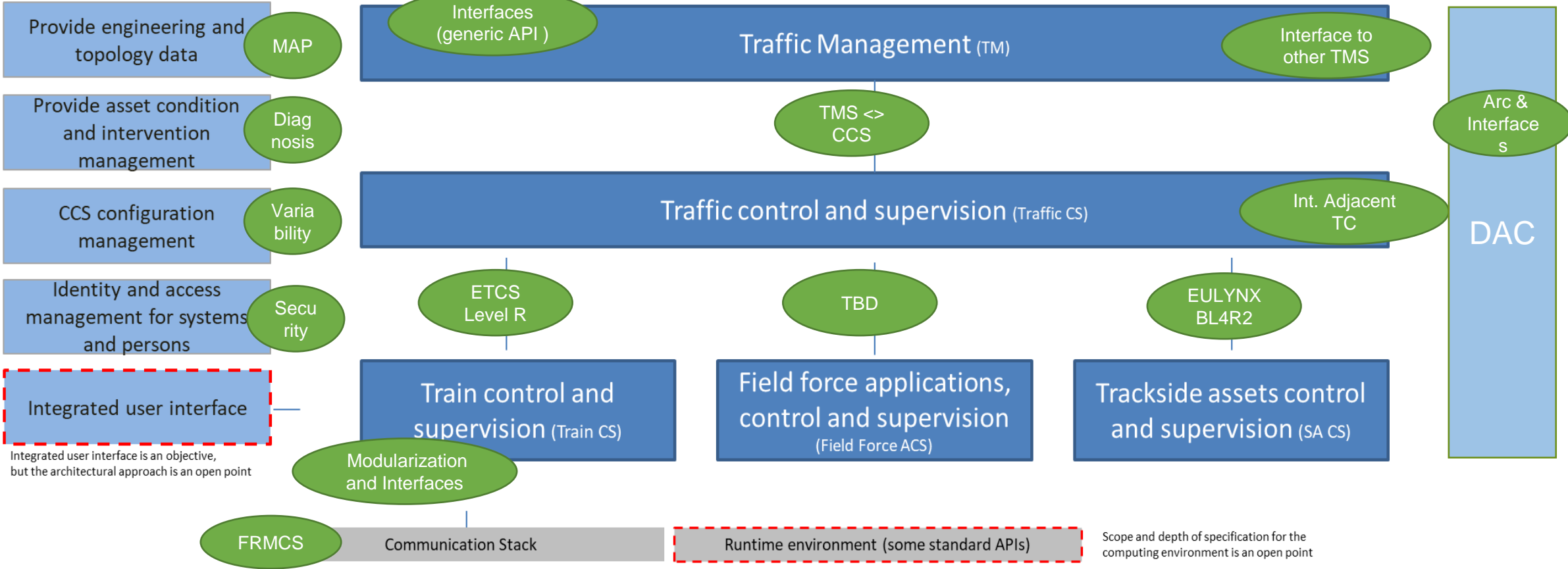




# To achieve a European approach, harmonised interfaces to other subsystems need to be defined and developed

Harmonized operational Concept, Process, Rulebook

Transversal systems





DELIVER AN **INTEGRATED EUROPEAN RAILWAY NETWORK BY DESIGN**



DEVELOP A **UNIFIED OPERATIONAL CONCEPT AND A FUNCTIONAL SYSTEM ARCHITECTURE** FOR INTEGRATED EUROPEAN RAIL TRAFFIC AND CCS/AUTOMATION



DELIVER A **SUSTAINABLE AND RESILIENT RAIL SYSTEM**



DELIVER A **COMPETITIVE, GREEN RAIL FREIGHT FULLY INTEGRATED INTO THE LOGISTICS VALUE CHAIN**



DEVELOP A **STRONG AND GLOBALLY COMPETITIVE EUROPEAN RAIL INDUSTRY**

# EUROPE'S RAIL: ONE INTEGRATED R&I PROGRAMME

## SYSTEM PILLAR

OPERATIONAL CONCEPTS

FUNCTIONAL SYSTEM ARCHITECTURE

**A SINGLE COORDINATING BODY FOR THE WHOLE SECTOR EVOLUTION**

OPEN INTERFACES TO OTHER TRANSPORT MODES AND BUSINESSES

SYSTEM REQUIREMENT SPECIFICATIONS

## INNOVATION PILLAR

*TECHNOLOGICAL AND OPERATIONAL SOLUTIONS FOR SERVICES OF FUTURE*

FLAGSHIP PROJECTS

LARGE-SCALE DEMONSTRATIONS

EXPLORATORY AND FUNDAMENTAL R&I

1

**EUROPEAN RAIL TRAFFIC AND MOBILITY MANAGEMENT**

Manage and improve rail traffic at EU level

Adjust rail traffic management in function of the mobility demand

2

**DIGITALISATION & AUTOMATION IN TRAIN OPERATIONS**

ATO implementation

Digital train operations

3

**SUSTAINABLE AND DIGITAL ASSETS**

Integrated assets testing & life-cycle framework

Zero-emission, silent rail system

4

**COMPETITIVE, DIGITAL, GREEN RAIL FREIGHT**

New digital customer interaction & innovative rail freight services

Multimodal and rail freight innovation integration

5

**REGIONAL RAIL SERVICES IN LOW DENSITY AREAS**

New system approach to regional rail services in low density areas

## DEPLOYMENT GROUP

FUTURE SOLUTIONS DEPLOYED IN A COORDINATED AND CONSISTENT WAY AT EUROPEAN LEVEL, TAKING INTO ACCOUNT ALTERNATIVE ROLLOUT SCENARIOS, BEHAVIOURAL AND ORGANISATIONAL CHANGES, SYNERGIES WITH OTHER MODES OF TRANSPORT



# SP Task 3 - TMS/CMS operational concept, architecture and specifications

- Develop a unified Operational and Functional Concept for TMS, starting from and according to the previous achievements in the EU context
- Specify and deploy a functional TMS architecture aiming to:
  - Support the harmonization of the operational rules for the several EU Railway organizations
  - Standardize the next generation railway process
  - Optimization of the strategic and tactical planning
  - Foster a seamless integration with external actors and systems
  - Improve TMS resilience and efficiency
  - Manage efficiently deviations and incidents
  - Improve automation and energy saving
  - Reduce production costs and improve maintainability
- Team of 16 persons ensuring a balanced representation of railway stakeholders (IMs, RU, Suppliers, UNIFE, RNE)
- Supported by sector-aligned mirror groups, to ensure sector alignment and full input

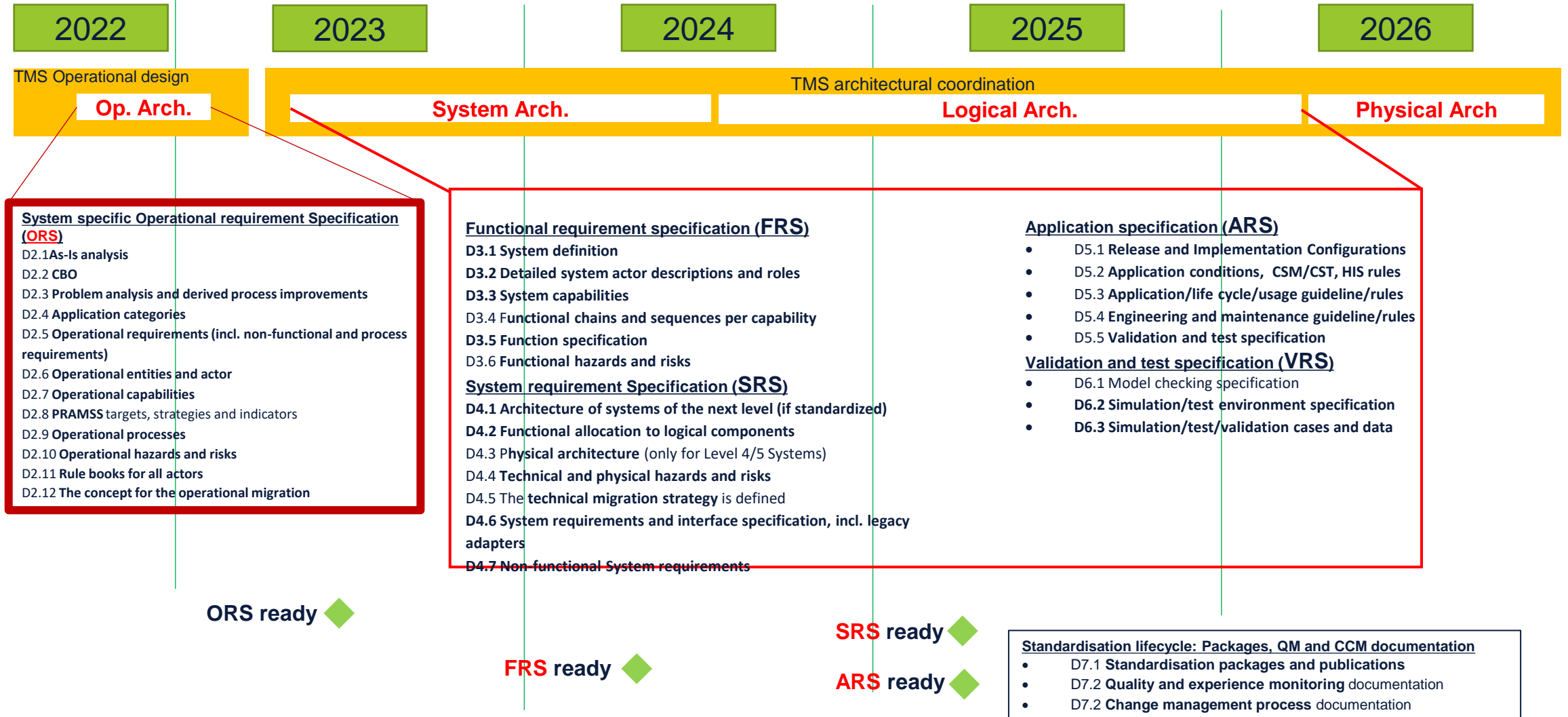


# SP Task 3 – 2023 key deliverables

- **System Concept**
  - Defines scope, context, and purpose of the system
- **System Definition**
  - Gives TMS/CMS goals and mission profile
  - Describes system scope, system boundary and main system functions
  - *It's a live document, which is updated even after 2023 to include other topics, as life-time considerations etc.*
- **System Requirement Specification**
  - Describes Functional and Non-Functional system requirements
  - *It's a live document, which is updated even after 2023 to refine requirements and align with the design process*
- **TMS/CMS Architecture Principles**
  - Deals with Logical and Physical architecture
  - *It's a live document, which is updated even after 2023 to refine requirements and align with the design process*
- **TMS/CMS Operational Processes**
  - Long term operating strategy and conditions (operational processes)
  - Description of operating procedures

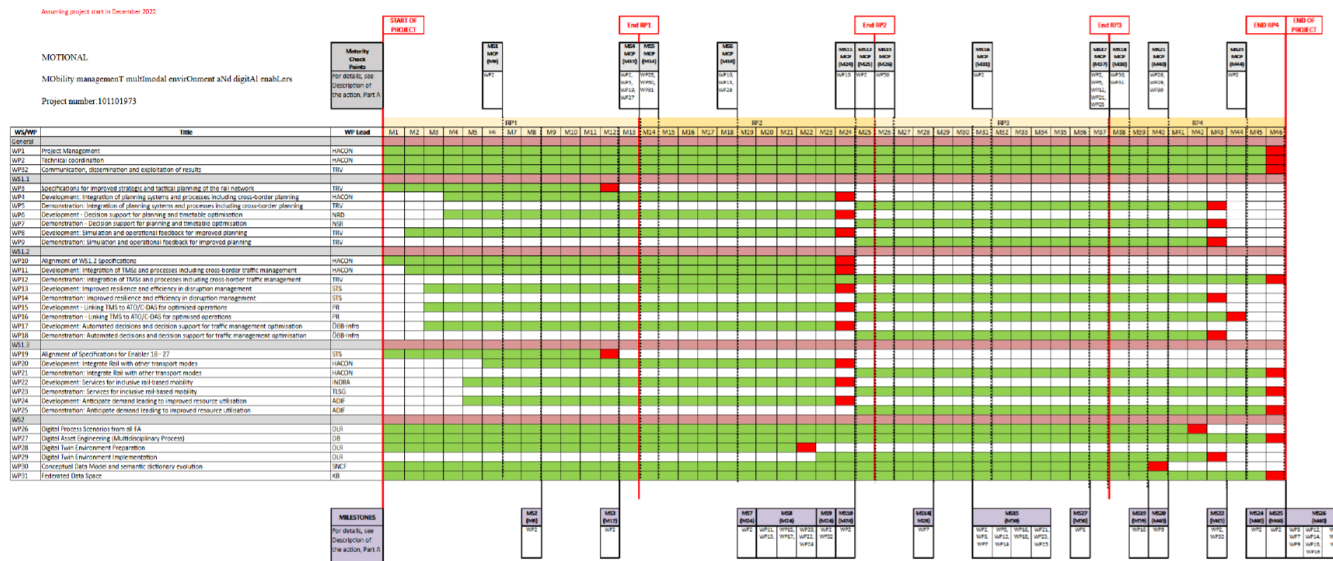
# SP Task 3 – longer term planning

## System Pillar: Task 3 planning

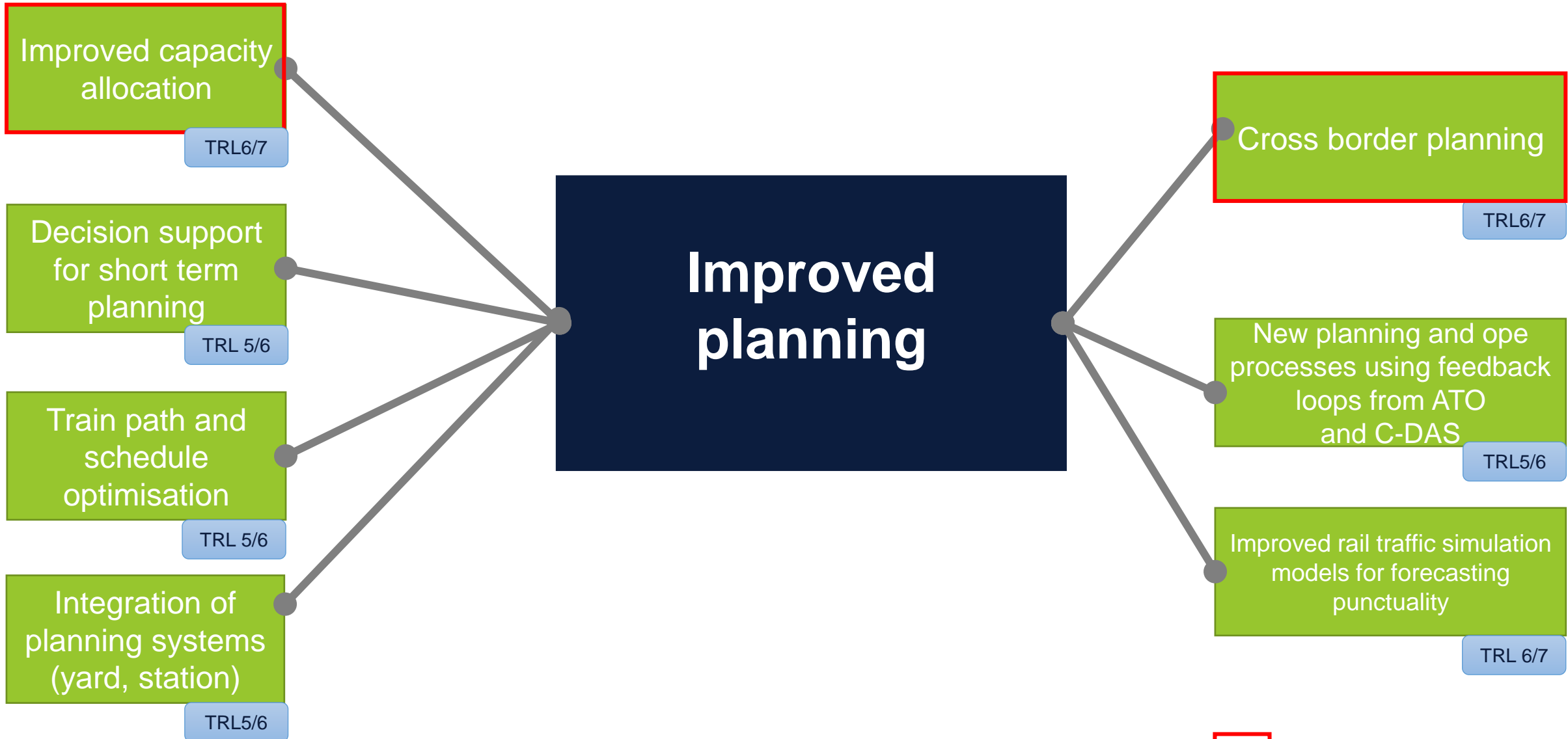


# IP FP1: TMS/CMS – Technical Demonstration

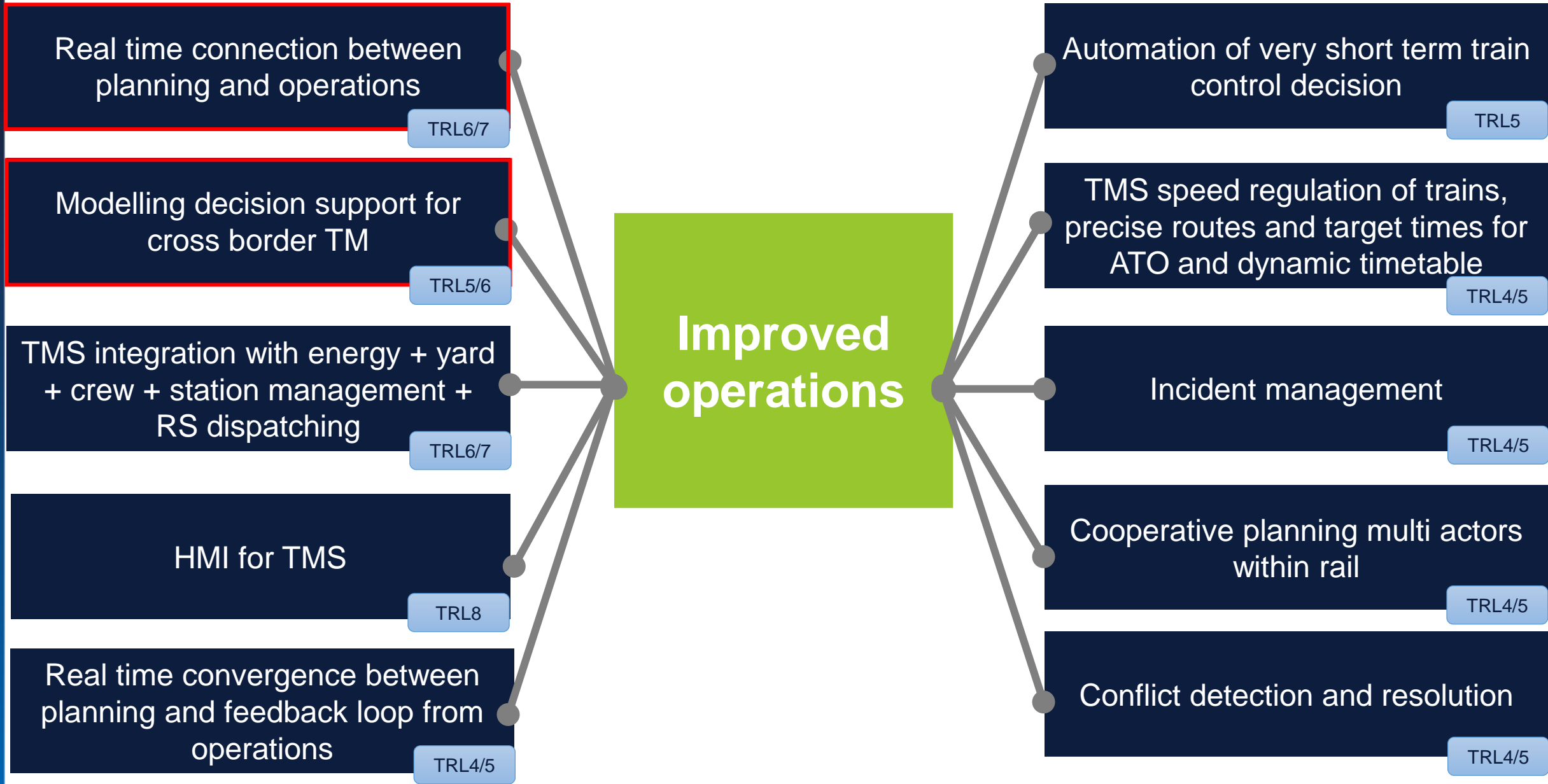
- Flagship Project: FP1-Motional
- Development and demonstration of technical enablers towards the CMS/TMS vision
- Building on Shift2Rail results: In2Rail, X2Rail-4, OPTIMA, FINE-2, PLASA-2, FR8Rail-II, LinX4Rail and LinX4Rail-2
- Start December 2022, duration 46 months (September 2026)
- Total project size 92.6m EUR, EU contribution 37.9m EUR
- 89 participants, 29 main beneficiaries



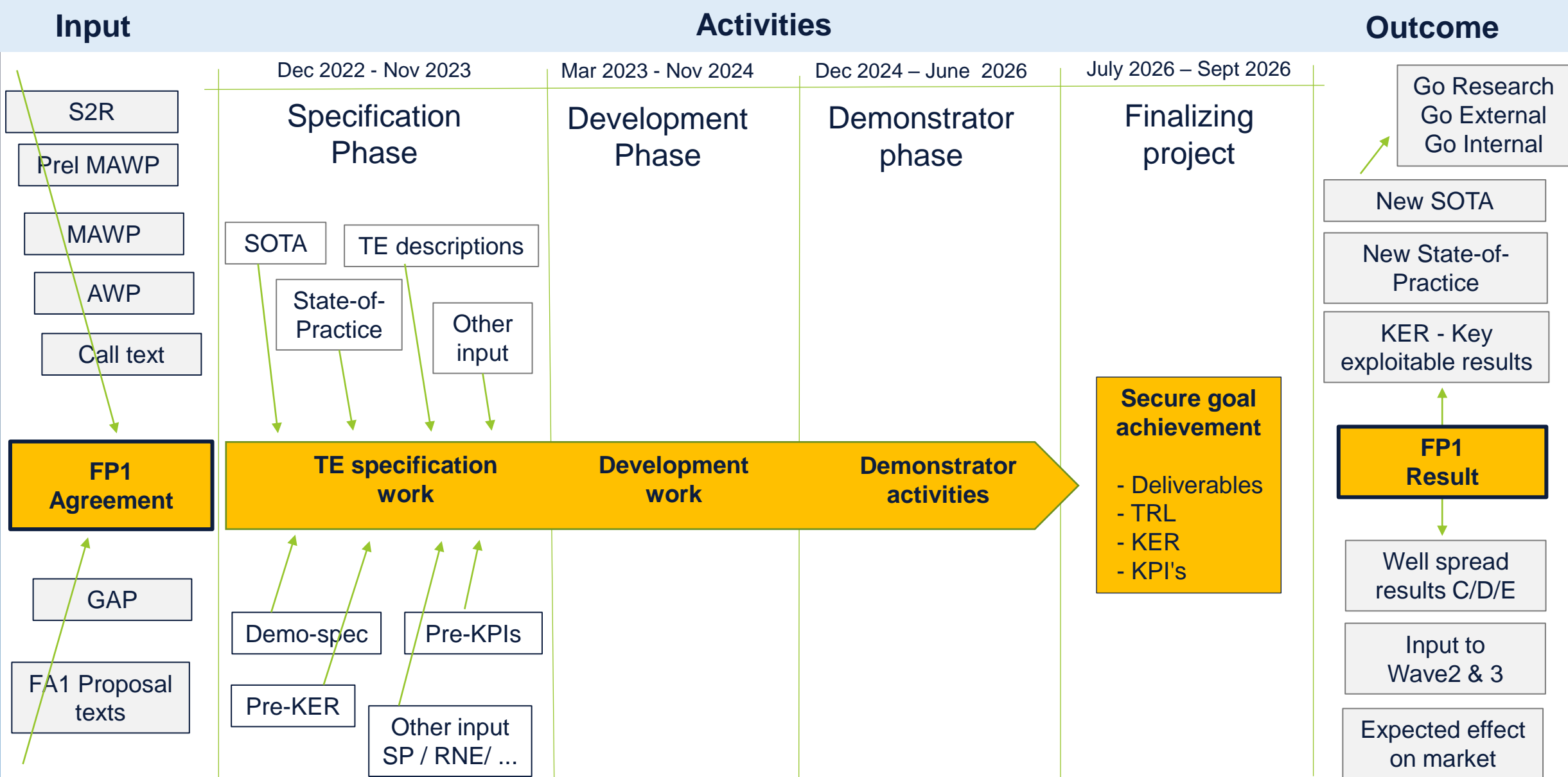
# IP FP1: Improved planning: technical enablers



# IP FP1: Improved operations – Technical enablers



# IP FP1: approach

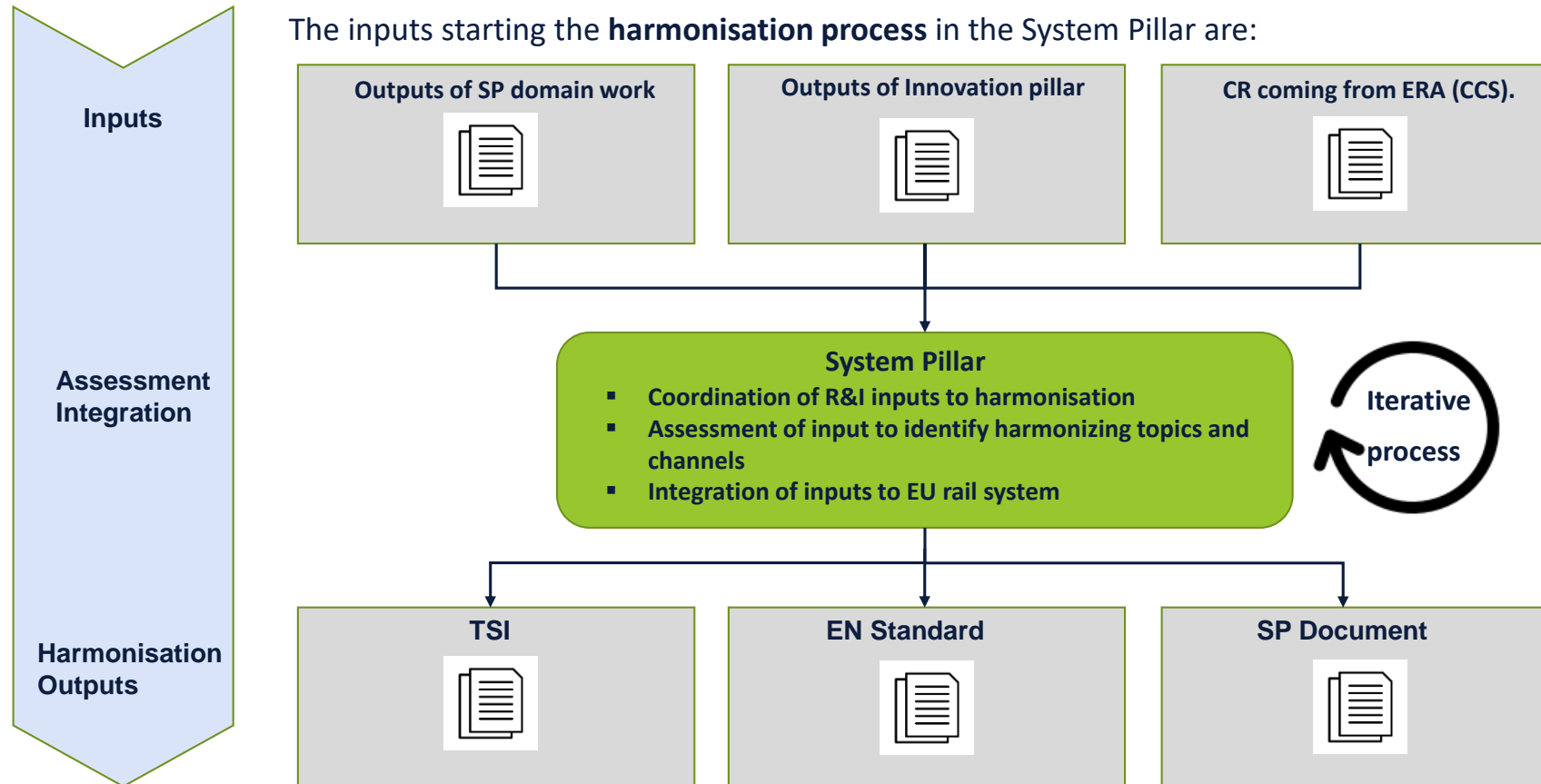


Outputs of EU-Rail activity will be relevant to:

- Legal initiative on capacity planning and capacity management
- TSI
  - TAP/TAF
    - Interfaces for European cross border for planning and operations
    - Interface with yards, stations specific systems
    - Interface with ROC systems
    - ...
  - OPE
  - CCS
    - Interface for feedback loop from ERTMS, ATO
- RINF
  - Future integration of data bases

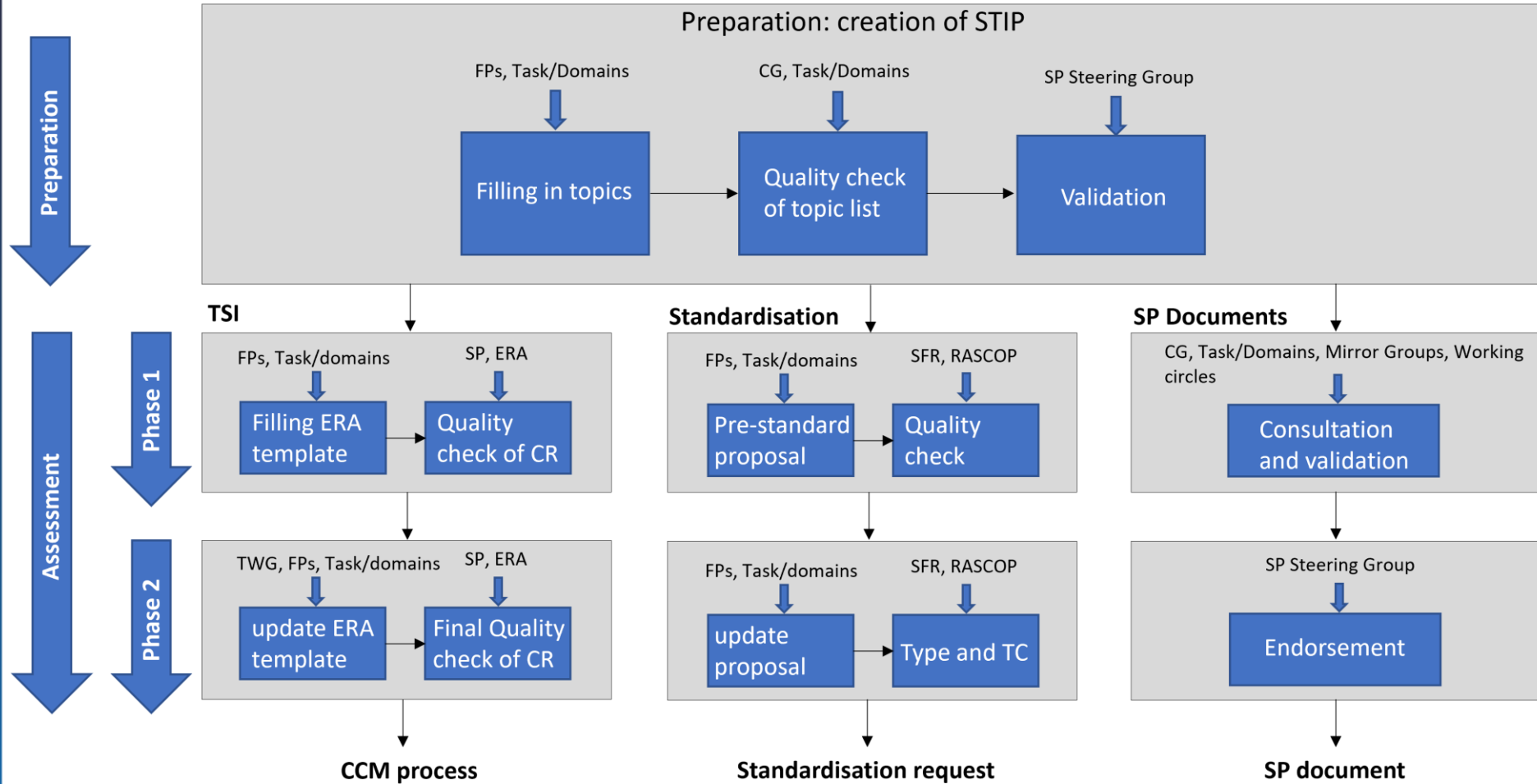
- Changes in the legal framework should not restrict more dynamic, integrated, digital and automated TM
- Legislation should ensure “technological neutrality “

# System Pillar Standardisation and TSI Input Plan





# System Pillar Standardisation and TSI Input Plan



- Collection of topics delivered by FPs and task/domains
- Quality check by ERJU (supported by CG, horizontal domain)
- Discussion and validation in Steering Group

- Topic descriptions sent to CCM and SFR/RASCOP
- Assessment of proposals
- Update by FPs and task/domains

**Thank you**

