Europe's Rail Joint Undertaking Governance and Process Handbook

Version 2.5

2 September 2022

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Glossary

ED	Executive Director
ED-SIPB	System and Innovation Programme Board
ERA	European Union Agency for Railways
GAP	Grant Agreement Preparation
GB	Governing Board
HE	Horizon Europe
IKAA	In-kind contribution for additional activities
IKOP	In-kind contribution for operational activities
MAWP	Multi-Annual Work Programme
OLAF	European Anti-Fraud Office
Private Members	any legal entity established under public or private law that is a member of EU-Rail joint undertaking other than the Union, participating states or international organisations
R&I	Research & Innovation
REA	Research Executive Agency
SBA	Single Basic Act
SC	Scientific Committee
SERA	Single European Railway Area
SRG	States Representatives Group
WP	Work Programme

1 Introduction

1.1 Purpose and scope of the Handbook

The purpose of the Governance and Process Handbook is to:

- Describe the governance and processes of the Europe's Rail Joint Undertaking (hereafter referred to as "EU-Rail" or "the JU");
- Define the roles and responsibilities of EU-Rail;
- Specify the key documentation, reporting and evaluation requirements for the execution of the Programme, System Pillar, Innovation Pillar and Deployment Group.

The scope of the Governance and Process Handbook is limited to:

- The roles and responsibilities of the EU-Rail JU Programme Office and interfaces with the Members other than the Union (hereafter also "Private Members") to implement the EU-Rail Programme;
- The roles and responsibilities of the Private Members and the interfaces between these Private Members;
- The roles and responsibilities of EU-Rail and the Private Members towards other beneficiaries and third parties involved in the Programme.

Additionally, it provides recommendations for future Projects' governance in relation to the Programme implementation.

1.2 Position in the EU-Rail documentation hierarchy

The position of the EU-Rail Governance and Process Handbook is based on the overall document hierarchy shown in Figure 1.

The Single Basic Act[1] (hereafter referred to as "the SBA") defines the rules underpinning the JU as body of the European Union entrusted with the implementation of the EU-Rail Initiative.

The EU-Rail Master Plan constitutes the JU's Strategic Research and Innovation Agenda within the meaning of SBA Article 2(12). It provides guidance for EU-Rail's more specific tasks, namely an overview of the ambitions and the objectives of the JU, and defines a systemic, long-term and result-oriented delivery strategy for research & innovation in the railway sector (Article 86(5) of the SBA).

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[1]   COUNCIL REGULATION (EU) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe and repealing Regulations (EC) No 219/2007, (EU) No 557/2014, (EU) No 558/2014, (EU) No 559/2014, (EU) No 560/2014, (EU) No 561/2014 and (EU) No 642/2014

The Multi-Annual Work Programme (MAWP) is the translation of the EU-Rail Master Plan into a detailed, medium-long term R&I plan that concretely identifies the activities, milestones, deliverables and large-scale demonstrations to achieve the overall Master Plan objectives through setting out the Programme activities, detailing in particular the System Pillar and Innovation Pillar. The MAWP is implemented via Work Programmes adopted by the Governing Board and resulting in an integrated set of R&I activities from the awards of grants or contracts.
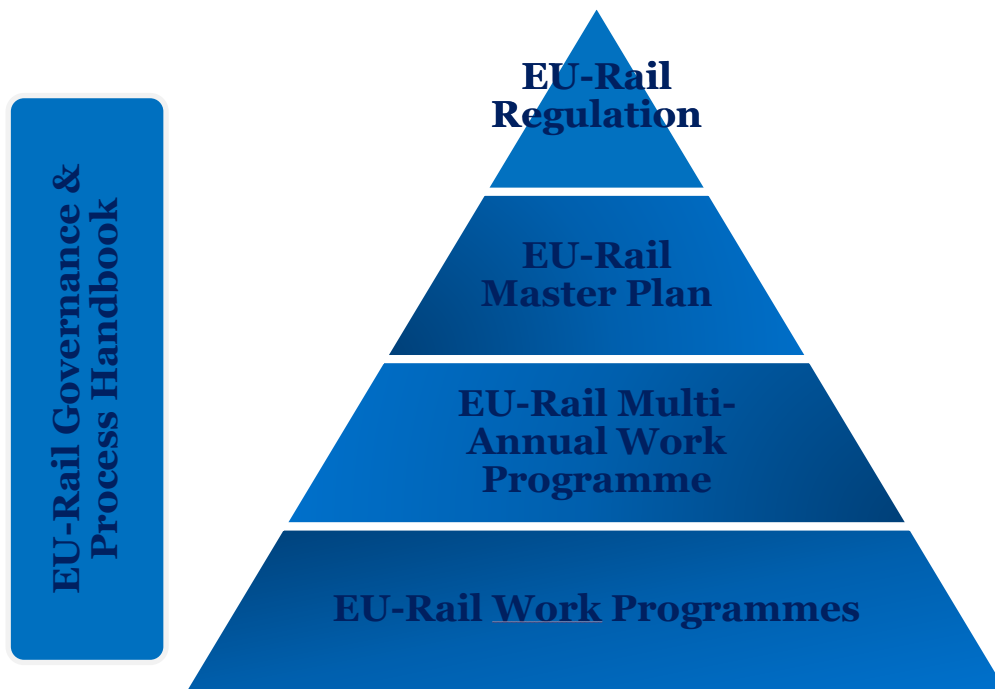
Figure 1 - Position of the Governance and Process Handbook

The EU-Rail JU Governance and Process handbook describes the procedures, processes and actions underpinning the implementation of the EU-Rail Programme and the roles and responsibilities of EU-Rail JU and its Private Members. The handbook defines and documents the Programme governance and relevant business processes, including relevant templates and guidelines.

1.3 Context

EU-Rail is the European partnership on rail research and innovation established under Horizon Europe, taking over and building on the achievements of the Shift2Rail Joint Undertaking (hereafter "S2R" or "S2R JU")[2].

Starting from the building blocks and technology enablers delivered by S2R, the objective of EU-Rail should be to deliver a high-capacity integrated European railway network by eliminating barriers to interoperability and providing solutions for full integration, covering traffic management, vehicles, infrastructure and services, aiming at faster uptake and deployment of projects and innovations. This should exploit the huge potential for digitalisation and automation to reduce rail's costs, increase capacity, and enhance its flexibility and reliability, and should be based upon a solid Reference Functional System Architecture shared by the sector, in coordination with the European Union Agency for Railways.

In addition to the objectives set out in Articles 4 and 5 of the SBA, EU-Rail shall also have the following general objectives:

- contribute towards the achievement of the Single European Railway Area;
- ensure a fast transition to more attractive, user-friendly, competitive, affordable, easy to maintain, efficient and sustainable European rail system, integrated into the wider mobility system;
- support the development of a strong and globally competitive European rail industry.

In addition, EU-Rail shall also have the following specific objectives:

- facilitate research and innovation activities to deliver an integrated European railway network by design, eliminating barriers to interoperability and providing solutions for full integration, covering traffic management, vehicles, infrastructure also including integration with non-standard national gauges, such as 1520, 1000 or 1668 mm railway, and services, and providing the best answer to the needs of passengers and businesses, accelerating uptake of innovative solutions to support the Single European Railway Area, while increasing capacity and reliability and decreasing costs of railway transport;
- deliver a sustainable and resilient rail system: by developing a zero-emission, silent rail system and climate resilient infrastructure, applying circular economy to the rail sector, piloting the use of innovative processes, technologies, designs and materials in the full life-cycle of rail systems and developing other innovative solutions to guided surface transport;
- develop through its System Pillar a unified operational concept and a functional, safe and secure system architecture, with due consideration of cyber-security aspects, focused on the European railway network to which Directive 2016/797 applies, for integrated European rail

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[2] Council Regulation (EU) No 642/2014 of 16 June 2014 establishing the Shift2Rail Joint Undertaking

traffic management, command, control and signalling systems, including automated train operation which shall ensure that research and innovation is targeted on commonly agreed and shared customer requirements and operational needs, and is open to evolution;

- facilitate research and innovation activities related to rail freight and intermodal transport services to deliver a competitive green rail freight fully integrated into the logistic value chain, with automation and digitalisation of freight rail at the core;
- develop demonstration projects in interested member states;
- contribute to the development of a strong and globally competitive European rail industry;
- enable, promote and exploit synergies with other Union policies, programmes, initiatives, instruments or funds in order to maximise its impact and added value.

In carrying out its activities, the Europe's Rail Joint Undertaking shall seek a geographically balanced involvement of members and partners in its activities. It shall also establish the necessary international connections in relation to rail research and innovation, in line with the Commission priorities.

2 Programme Cycle

2.1 EU-Rail Master Plan[3]

The EU-Rail Master Plan was developed by the European Commission services in close cooperation with the Candidate Founding Members, and in consultation with rail stakeholders. Inter alia, it serves as a reference document for the call of associated members to achieve a more competitive and resource-efficient European transport system to address major societal issues such as rising traffic demand, transport safety, security of energy and climate change. It contains key priorities and the essential system activities and innovations required to achieve impact at EU level, while providing guidance in the development of the objectives of the JU.

The Master Plan constitutes a common, forward-looking roadmap based on a system view that identifies the areas of intervention within the scope of the Europe's Rail Joint Undertaking. It contains the EU-Rail's priority research and innovation activities, and overall system architecture and harmonised operational approach, including large-scale demonstration activities, required to accelerate the penetration of integrated, interoperable and standardised technological innovations necessary to support the SERA.

2.2 EU-Rail Multi-annual Work Programme (MAWP)

As already indicated, the Multi-annual Work Programme (MAWP) provides a high-level view of what needs to be done; it explains why and by when. It sets the framework for the research and innovation (R&I) activities to be performed within and beyond the EU-Rail Programme and the deployment activities to be carried out by all operational stakeholders, coordinated to achieve the Single European Railway Area.

It is as well the translation of the EU-Rail Master Plan into a detailed, medium-long term R&I plan that concretely identifies the activities, milestones and deliverables to achieve the overall Master Plan objectives. The MAWP is implemented through R&I activities awarded in the form of grants or contracts.

2.3 From the Work Programme (WP) to the Project Kick-Off

Taking into consideration the current legal framework, the EU-Rail Programme is implemented through Work Programmes (WPs) adopted on an annual basis[4] which detail the R&I activities to be performed in the years to come (from 12 to 48 months indicatively).

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[3] https://rail-research.europa.eu/wp-content/uploads/2022/03/EURAIL_Master-Plan.pdf
[4] Each Work Programme of the JU could be prepared and adopted to cover more than one year of the JU's activity, and therefore become multi-annual. This could be done considering the available budgetary resources for each year, including

Each WP follows a specific management cycle in line with the provisions of the EU-Rail Financial Rules[5]. It is established on the template provided by the Commission Services for all the JUs.

The WP for year N is established as from October year N-2.

The JU Programme Office, following a consultation process with the EU-Rail members and the JU advisory bodies, prepares "topics" per Flagship Areas/Exploratory Research and Other which detail how the activities are expected to be implemented and performed to achieve the MAWP.

The WP input shall be received from the members, scientific advisors, SRG, etc. not later than end of December of the year N-2, in order to ensure that the EU-Rail ED is in the position to submit the Preliminary Draft Budget for year N to the EC Services by 31 January N-1.

The Preliminary Draft Budget for year N includes the request to the Union in terms of Commitment and Payment Appropriations necessary to realize the activities planned in the WP year N.

The Preliminary Draft Budget for year N is discussed with the Commission Services and becomes part of the overall negotiations with the Union Budget Authority, the European Parliament and the Council.

During year N-1, the Programme Office takes over the input received, performs the institutional consultations provided for in the SBA and Financial Rules with the objective of its adoption at the GB meeting planned in the last quarter N-1.

In this respect, a consultation process with the EU-Rail members at technical expert level will be organized around Q2 of year N-1, to assess the initial input against the MAWP and the progress achieved so far in ongoing R&I activities. The final contributions to the WP for year N by the EU-Rail member at technical expert level shall be provided to the Programme Office not later than Q2 N-1.

In the same Q2 period N-1, EU-Rail presents the draft WP to the scientific advisors and the States Representatives Group (SRG); they provide their scientific and political advice/input in line with the SBA. This will be taken into account in the final draft of the WP to be submitted to the GB.

The European Union Agency for Railways (ERA) contributes in their advisory role (see section 3.4) and are part of the consultation process.

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under the multi-annuality by instalment principle as well as the SBA specific conditions. However, for simplification, we will always refer in this document to Work Programmes with the acronym "WP"
[5] https://shift2rail.org/wp-content/uploads/2020/01/S2R-JU-Financial-Rules.pdf

During the same Q2 period N-1, as far as feasible, the draft WP shall be presented also to the Commission Services in order to anticipate any possible comments and suggestions, and thus to streamline the final approval process within the GB.

As from July N-1 to the final submission to the GB, the Programme Office elaborates the final draft of the WP for year N, running specific consultations with its bodies.

In Q4 of N-1, the final draft WP is sent to the GB for its adoption by the end of October N-1. The adoption of the GB shall be formalized after having duly consulted the SC and SRG.

The WP for year N is published on the EU-Rail website on the date of the related GB Decision adoption. Unless the budget of the Union is adopted before that date, it shall contain a disclaimer indicating that the final amounts and content are subject to the final adoption of the budget of the Union for the respective year.

As a result of the WP adoption, the ED instructs the Programme Office to launch the publication of the call for proposals and/or call for tenders. The call(s) for proposals are made available on the Funding & Tender opportunities website of the European Commission in accordance with the indicative calendar contained in the WP; similarly for the call(s) for tenders.

The call(s) for proposals should allow for sufficient time for the preparation of the proposals, as a principle, at least three months.

After the submission deadline, during a period of around 1 to 2 months, all received proposals are evaluated by panels which consist of an EU-Rail Programme Office representative moderating the meetings, a representative of the Commission Services and/or ERA as observers (where appropriate) and independent experts. The latter are selected by the Programme Office from the Expert Management database of the European Commission for Horizon Europe and are retained for evaluation following a verification of their absence of conflict of interest with regard to the submitted proposals. The independent experts remain anonymous to the beneficiaries.

The first step of the evaluation consists of an individual assessment by the independent experts. These individual assessments are provided to a rapporteur or recorder who will prepare the first draft of the evaluation report. A consensus meeting for each of the panels is then organised. During the panel meeting, all evaluators come together and try to reach consensus on the evaluation and relative score. The process is observed by an independent expert (called observer) to assess any possible issue, qualitative aspects, transparency, etc. This evaluation process is aligned with the evaluation of proposals described in Section 7.1.

In parallel to the operational evaluation, the legal and administrative evaluation of the proposals is performed by the EU-Rail Corporate Services Unit with the support of relevant Commission Services and of the Research Executive Agency (REA).

The panel reports are transmitted to the EU-Rail ED who, taking into account the outcome of the evaluation process, submits a report to the GB including his recommendations on the proposals' ranking and financing.

On the basis of the ED recommendation, the Governing Board shall approve the list of actions selected for funding, subject to the relevant provisions of the GB Rules of Procedure[6] on confidentiality and conflict of interests. Application of such provisions may entail, for example, the exclusion of a Member from a voting subject of which is a proposal submitted by that Member. The GB meeting is planned to take place 1.5 – 2 months after the date of call submission. As from then, the grant preparation phase starts with the aim of signing the awarded grants within the following 2 months. As from the grant signature, the "Project life cycle" starts.

2.4   Project life cycle

Supervision and monitoring activities of the Programme Office have been designed taking into consideration the nature of the Flagship Projects versus other projects and tender procedures.

2.4.1 Flagship Projects

Flagship Projects are management and administrative instruments for execution and control of the research and innovation activities that implement the EU-Rail Programme. They are functional to the delivery of the EU-Rail Programme's results, which is the ultimate goal of the partnership.

In order to support the collaboration within and between Flagship Projects, EU-Rail makes available a dedicated EU-Rail digital platform to organize meetings, share documents/information, review deliverables, monitor consumption of resources vis-à-vis the progress of the Projects, manage the risks and opportunities, etc. The platform is built with different levels of access, depending to the nature of the information.

In addition, a separate area of the platform is dedicated to Members of the JU which are beneficiaries of the Flagship Projects' grants to report Member contributions' certifications.

In addition, the EU-Rail platform allows for feeding data directly to the EU-Rail Website, where the different projects are presented. No website costs will be considered eligible in the EU-Rail Flagship Projects grants.

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[6] https://rail-research.europa.eu/wp-content/uploads/2022/01/GB-Decision-01-2021.pdf

The review and monitoring of the Flagship Projects are based on a calendar year cycle (see Figure 2). The reporting period for interim payment ends at the end of December each year. Where a project would start in the middle of the year with a duration during that year shorter than 6 months, the first period will end in December of the year N+1. Based on the rules of Horizon Europe, the Project Coordinator has 60 days as from that date to submit both their periodic financial and technical reports (i.e. by the end of February N+1), through the Horizon Europe Portal. The EU-Rail platform should be able to facilitate this reporting phase.

The last reporting period[7] for final payment based on the rules of Horizon Europe will coincide with the project end.

As from then, the Programme Office has 90 days to review, assess and decide about the interim or final payment of the co-funding. The Programme Office, helped by independent experts when needed, may carry out the review of the reporting/deliverables for the next 2 calendar years after the payment of the balance.[8]

Subject to the timely submission of the financial and technical reports, the annual review is carried out during April N+1, when the EU-Rail Programme Managers supported by experts and observers (External and/or from ERA and/or Commission) will assess the performance of the Projects in accordance with the criteria established in the EU-Rail Financial Rules, Horizon Europe Rules of Participation and the Grant Agreement and summarized in Chapter 7 – Quality management.

A delayed submission or re-submission after suspension of reports may result in the reduction of future and successive pre-financing, including in future calls.

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[7] Refer to Article 21 of the HE General MGA
[8] Refer Article 25 of the HE General MGA
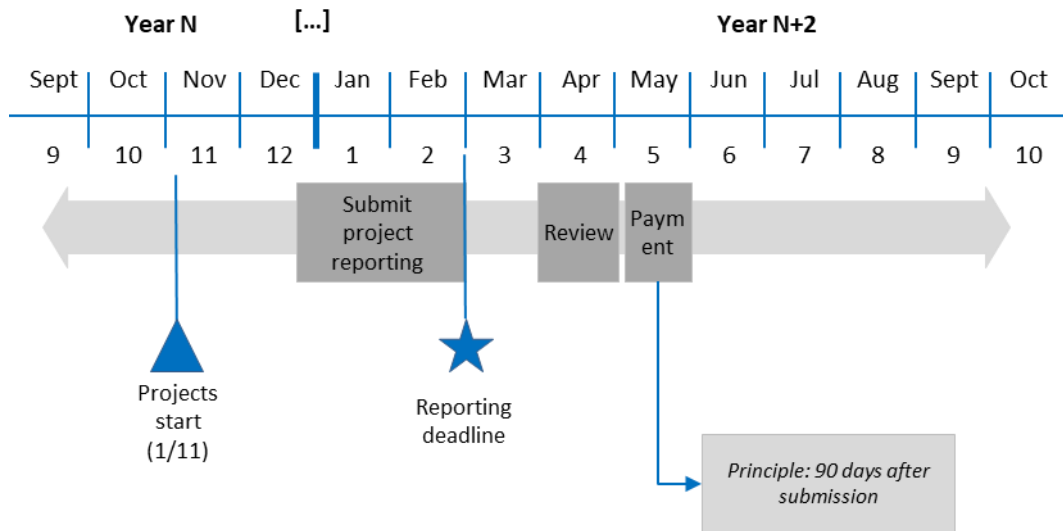
Figure 2 - Flagship Projects

The project review is performed through quantitative and qualitative data, as described in Chapter 7 – Quality Management.

In parallel to the Annual Review, the Financial Reporting will be subject to initiation and verification in accordance with the EU-Rail Financial Rules and any available vademecum / procedure / guideline applicable to Horizon Europe Grants.

As the Flagship Projects will be funded under the multi-annuality by instalment mechanism, the results of the Annual Review and the Financial Review will converge in

- a recommendation to the EU-Rail Authorizing Officer on the interim and final payment of the co-funding in accordance with the relevant grant agreement provisions;
- request(s) for additional information, clarifications, etc. in accordance with the procedure established in the Grant Agreement;
- a recommendation on the release of additional pre-financing for the following year, and/or a revision of the project considering its performance, or the termination of the grant. The Executive Director will seek the advice of the System and Innovation Programme Board based on the recommendation from the Programme Office with regard the latter.

2.4.2 Other Projects

With regard to other projects – that is other than Flagship Projects - the cycle is in line with the usual practice applied within HE projects. Consequently, the end of the reporting period for interim payment is not necessarily aligned with the annual cycle but may be set every 12 months after the start of the

project, for projects between 18 to 24 months, and every 18 months for projects with longer lifetime. Based on the rules of HE, the Project Coordinator has 60 days as from that date to submit both their periodic financial and technical reports, through the HE Portal.

EU-Rail will assess the periodic review and will decide on a case-by-case basis on the need for a project review with experts etc.

These projects do not benefit from the EU-Rail platform access and their dissemination and communication activities will be independent while aligned to the EU-Rail Communication Strategy, both internal and external (public). EU-Rail will ensure the connection with its website to create a platform for the Railway R&I.

A visualization is depicted in Figure 3:
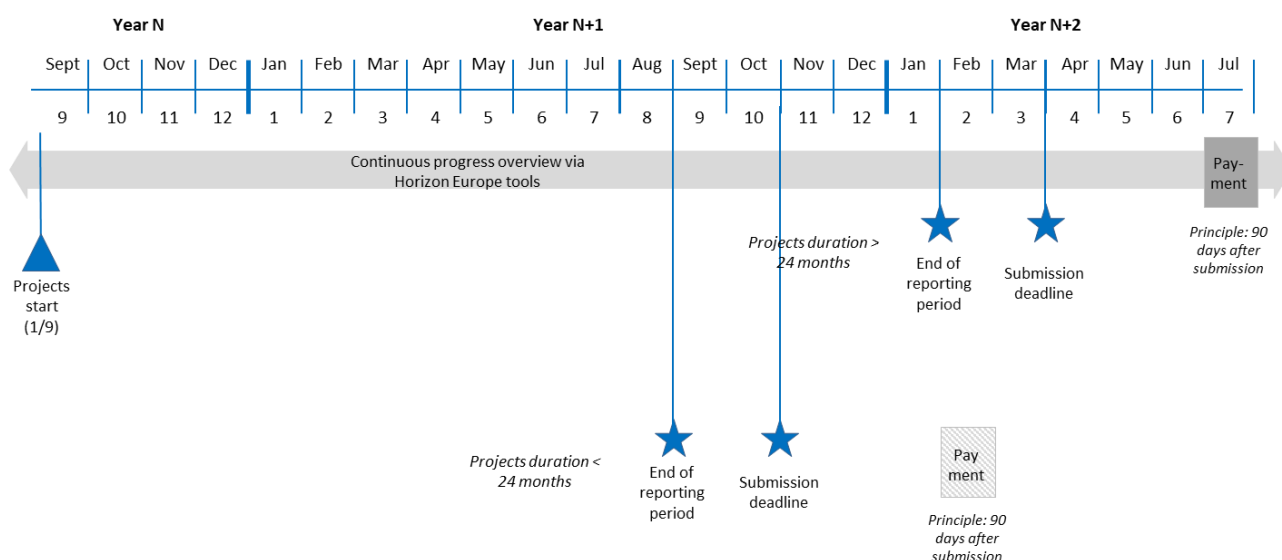
Figure 3 – other projects

2.5   IKOP and IKAA reporting Cycle

As specified in article 11(2) of the SBA regarding the Contributions from Private Members:

"The private members shall report by 31 May each year at the latest to their respective governing board on the value of the contributions referred to in paragraph 1, point (b), made in each of the previous financial years. For the purpose of valuing these contributions, the costs shall be determined in accordance with the usual cost accounting practices of the entities concerned, to the applicable accounting standards of the country where the entity is established, and to the applicable International Accounting Standards and International Financial Reporting Standards. The costs shall be certified by

an independent audit body appointed by the entity concerned and shall not be audited by the joint undertaking concerned or any Union body. The valuation method may be verified by the joint undertaking concerned should there be any uncertainty arising from the certification. In duly specified cases, the governing board may authorise the use of lump sums or unit costs for valuing those contributions."

Considering that lump sum grants will be used for the implementation of the Programme activities and that the projects shall not submit any certificate on financial statements, the Private Members of the JU should in principle not certify the IKOP annually anymore. However, the JU could conduct additional checks, reviews, and audit for the respect of the principles laid down in the SBA. With the objective of taking into consideration the overall target of leverage effect at Programme level (2.263 ratio), to which each Private Member agreed to contribute to in their respective Letters of Commitment.

Consequently, by 31 May of each year, the Private Founding Members would provide the JU with:
- A self-certification/statement of Total Project Costs (project total eligible costs (co-funding + IKOP) plus IKAA) incurred;
- An IKAA certification in accordance with Article 11(2) of the SBA

This is required to ensure that the Private Members' contributions are accounted for in the Annual Accounts of the JU.

The in-kind contribution reporting process would therefore be, in principle, as follows:

	Year 3												Year 4											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Technical activities year 3

Reporting Y2 — JU payments Y2 — JU IKOP validation Y2 — JU IKAA reporting Y2 — Reporting Y3 — JU payments Y3 — JU IKOP validation Y3 — JU IKAA reporting Y3

Private Members Certification IKAA Year 2 *incl TPC declaration*

JU: deviation 2,263 TPC confirmed

Private Members Certification IKAA Year 3 *incl TPC declaration*

Ad hoc:
- *Ex-post technical audit **AND/OR***
- *TPC certification (same guidance as for IKAA certification)*

Finally, by the end of 2022, the JU will prepare a guidance document on certification process for the Private Founding Members, based on the one used for the S2R Programme, incorporating the necessary updates with regard to:

- The general conditions and legal basis (SBA Art. 11(2): costs determined in accordance with the usual cost accounting practices, the applicable accounting standards of the country where the entity is established, and the applicable International Accounting Standards and International Financial Reporting Standards.),
- Model Terms of Reference for the Report on the IKAA (ad hoc TPC),
- Model Report – audit certificate templates based on ISA 805 and ISAE3000 (Revised),
- A new template for the Private Founding Members' self-certification of annual TPC incurred **(to replace the audit certificate on TPC as previously requested under the S2R JU)**
- A new template for the Private Founding Members' annual IKAA declaration (ad hoc TPC)

2.6   Monitoring progress and impact

The Master Plan defined the EU-Rail Impact Areas and identified a two-layers method of the Key Performance Indicators. In addition, specific Horizon Europe implementation indicators are also defined and reported on annual basis (in the JU's Annual Activity Report) and biennial basis (in the EC Biennial Monitoring Report for partnerships).

For each Flagship area, specific KPIs are defined and quantified targets are set in the EU-Rail MAWP. These are the **first layer KPIs** related to the **technological and operational impacts,** those will be in place to measure the performance of the Flagship Projects. The calculation and monitoring of these specific KPIs are part of the Flagship Projects, based on common baselines and processes of reporting. Beside a continuous monitor performed by the JU (see chapter 7.3) and specific maturity checkpoints for the Flagship Projects (see chapter 7.4), a consolidation of the different Flagship Projects input will be performed by the Joint Research Centre (JRC)[9], in view of calculating also the societal impacts KPIs. These KPIs will enable to assess whether the Flagship Areas are contributing towards their objectives defined in the Multi-Annual Work Programme, reflected in the Destination topic text and ultimately in the respective Grant Agreements.

The **second layer KPIs**, **the societal impacts** of the EU-Rail Programme, will be related to the EU-Rail's expected impacts defined in its Master Plan, starting from the results obtained with the first layer KPIs. The Societal Impacts measurement methodology will be developed in the first two years of the functioning of the Joint Undertaking on the basis of the technical and operational KPIs provided. The activities related to the KPI definition are carried out together with JRC, who will then be in charge of the development and the monitoring of these high-level performance indicators for the JU, and under its supervision. JRC will also ensure to define a common baseline and harmonised approach for the Flagship Areas as well as they will set up the requirements/data input expected from the Flagship Projects. The JU will ensure that the necessary input will be received from the respective Flagship Projects. These KPIs will be presented to the EU-Rail Governing Board at least 3 times during the Programme duration, as indicated in the EU-Rail Master plan after each round of demonstrations in 2025, 2027 and 2030.

2.7   Project closure and final review

The objective of a project closure is to ensure that the project is closed efficiently and effectively. This is done by ensuring that the agreed scope has been completed, costs are in line with the contract, status is documented, project objectives have been achieved, no work or actions are left outstanding, and all parties have been informed of the project closure and agree upon it. Project closure takes place when all its goals are completed, or if a decision is taken to end the project early.

This process will take place in accordance with the procedures established in Articles 21 and 25 of the Grant Agreement.

A final review, compliant with the internal quality process, will be performed at the end of each project. This review will follow the same process as the annual reviews, described in section 2.4.

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[9] The Joint Research Centre (JRC) is the European Commission's science and knowledge service which employs scientists to carry out research in order to provide independent scientific advice and support to EU policy.

2.8   Controls and audit

According to Article 25 of the Grant Agreement, EU-Rail and/or the Commission can perform checks, reviews and audits of the proper implementation of the action by the beneficiaries as described in the respective grant agreement.

The checks are conducted by EU-Rail and, as an example, they may take form of asking the coordinator (or directly the beneficiaries) for additional information, at any time during the action of afterwards.

The reviews normally concern mainly the technical implementation of the action, but may also cover financial and budgetary aspects or compliance with other obligations under the Grant Agreement. For Flagship Projects checks are foreseen for the Maturity checkpoints (see section 7.4). They are conducted by EU-Rail, making use of external experts as needed, and they consist of in-depth examinations of the progress of the action. They could be conducted at any moment and until the time-limit set out in the Grant Agreement Data Sheet.

The audits may cover financial, technical or compliance aspects with regard to the obligations under the Grant Agreement (e.g. use of the logo). They may be performed by EU-Rail, the Commission Services or any appointed entity on behalf of EU-Rail. They could be conducted at any moment and until the time-limit set out in the Grant Agreement Data Sheet.

Under the lump sum grants, in accordance with the Grant Agreement, there are no ex-post financial audits foreseen. Instead, in accordance with its Financial Rules, the JU shall develop an assurance process allowing for reviews/audits rather focused on the projects' qualitative aspects, that is focused on the assessment of the delivery of the project's objectives defined in the Grant Agreement.

In accordance with the Grant Agreement, audits, checks and investigations can be performed by the European Court of Auditors and OLAF.

If the checks, reviews, audits or investigations shows ineligible contribution or serious breach of obligations, it may lead to contribution rejection or grant reduction and, if necessary, to a recovery (as per Art. 27 and 28 of the Grant Agreement).

The Impact Evaluations of the action, may also be performed according to Article 26 of the Grant Agreement, measured against the objectives and indicators of the EU programme funding the grant. They are conducted by EU-Rail, making use of external experts as needed, and such evaluations may be started during implementation of the action and until the time-limit set out in the Grant Agreement Data Sheet.

If the impact evaluation shows ineligible contribution or serious breach of obligations, it may lead to contribution rejection or grant reduction and, if necessary, to a recovery (as per Art. 27 and 28 of the Grant Agreement). As already indicated, EU-Rail will apply the lump sum approach for the grants awarded. This is regarded as an administrative simplification as there is no requirement for

certification of the financial statements, monitoring or reporting of eligibility of costs in accordance with HE, etc. Thus, for the sake of the EU-Rail grant management as such, beneficiaries do not need to keep specific records, complying with HE rules, on the actual costs incurred. However, it should be noted that the beneficiaries must – at least until the time-limit set out in the Grant Agreement Data Sheet – keep records and other supporting documents to prove the proper implementation of the action (proper implementation of the work and/or achievement of the results as described in the GA Annex I) in line with the accepted standards in the respective field (if any). The beneficiaries must keep the original documents. Digital and digitalised documents are considered originals if they are authorised by the applicable national law. The JU may accept non-original documents if they offer a comparable level of assurance.

The checks and reviews conducted by the JU will focus on the full accomplishment of the work committed in Annex 1 (Description of the action) of the Grant Agreement, checking in each reporting period which work packages have been successfully concluded and releasing the corresponding lump sum amount share only for those ones. Within the final payment process, partial releases of the lump sum amount share are possible.

3   EU-Rail Governance

This chapter introduces the elements of governance established in order to manage the JU's Programme and the related activities. It also provides details on the bodies that help the JU to steer its Programme.

3.1   Basis of Authority and EU-Rail JU Governance Structure

The SBA represents the constituent act of the JU. Section 4 of the MAWP provides details concerning the governance of the JU.
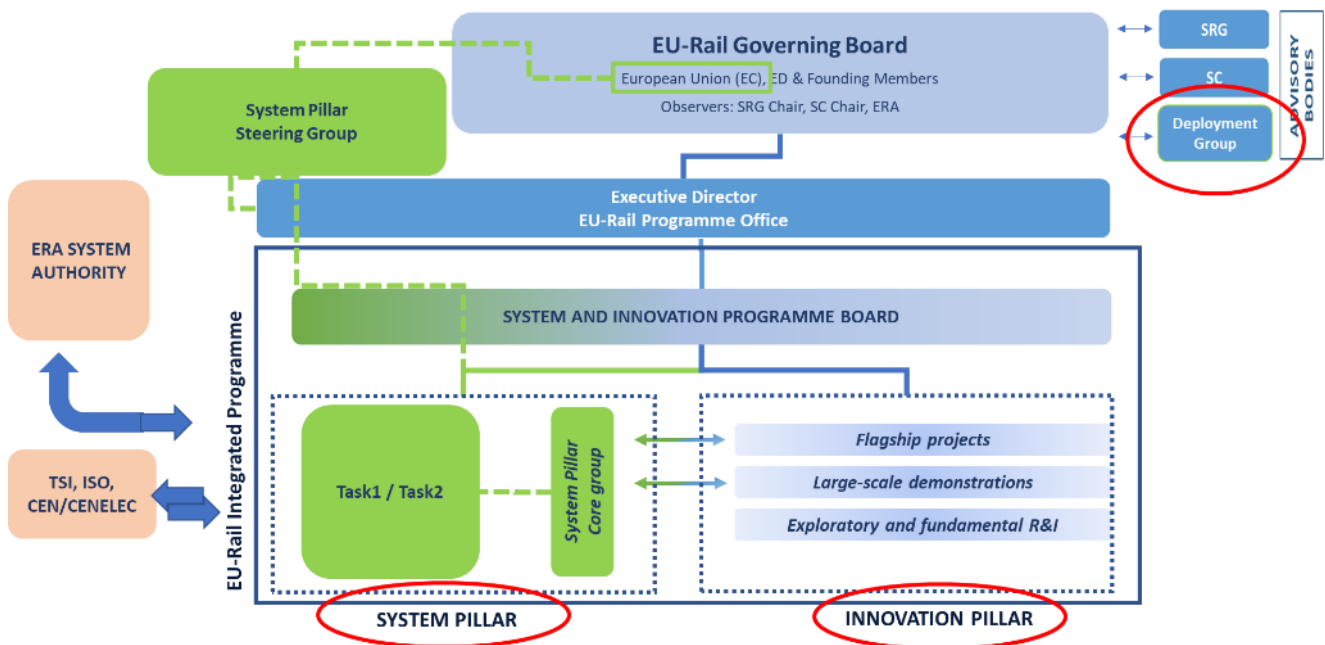
Figure 4 - Governance Structure

3.2   System Pillar

The following are the **guiding principles** of the System Pillar Governance.

- The **main governance bodies** involved in the System Pillar are:
  - The System Pillar Steering Group
    - is responsible for providing advice to the Executive Director and the Governing Board on:
      - the approach to operational harmonisation and the development of system architecture

- the detailed annual implementation plan for the System Pillar in line with the work programmes adopted by the Governing Board

- monitoring the progress of the System Pillar.

  - The System Pillar Unit

    - Chairs the System Pillar Core Group

    - Reports to System Pillar Steering Group

    - Coordinates related resources, budget and timescales to the System and Innovation Pillar Programme Board

  - The System Pillar Core Group

    - Provides the competent leadership and expertise of the development of the functional layered railway system architecture, specification models and Operational Concepts that enable safe, secure and efficient delivery of the new systems

    - Manages the common business objectives and deliverables from the Tasks

  - The System and Innovation Programme Board advises the Executive Director on:

    - the coordination of resources, budgets and timescales of the System and Innovation Pillars

    - project and programme management of the JU including interaction between the two pillars as well as change management and conflicts, supported by the System Pillar Core Group.

- The **Standardisation and TSI Input Plan** that will be developed by the System Pillar in alignment with the Railway sector organization, will per architecture element

  - Propose a channel

    - **Publication** by System Pillar

    - **Standardisation** (as defined in EU regulation 1025/2012)

    - **Regulation** by TSI (ERA, COM)

  - Propose a "grade of specification"

    - "**Strict**" specification: Full, precise, and mandatory regulation of a process, an interface or system functionality (TSI)

    - "**Core**" specification: Precise and mandatory specification of a part of a process, an interface or part of a system functionality (TSI)

    - "**Market specifications**": Publications that are often used in the market because of agreements in the sector or in a part of the sector

    - "**Guidelines**": Not mandatory, content depth varies depending on the issue and target (ERJU / SP guidelines)

o Propose the timeline for the specification output

- The System Pillar activities are executed in close relationship with ERA, including supporting ERA as ERTMS system authority on ERTMS and telematics.

The System Pillar **working method** aims at fast and balanced decision making with full sector involvement. Integrated teams within one place - the System Pillar - will work on and propose developed positions for sector consideration:

- To ensure best results to the benefit of the sector, the System Pillar design process will ensure clarification and agreement on objectives and requirements early in the process as a basis for the subsequent decisions on operational design and architecture.

- The aim is to have developed positions put forward by the tasks and associated domain teams based on concentrated resource and a short interaction flow on system design level within the System Pillar teams, enabling speed of development.

- Where appropriate, sector organizations are encouraged to support their representatives in the System Pillar teams and the Core Group with input - consolidated positions, early consideration of issues etc.

- Decisions can be made on the lower levels (within the Task cross-cutting or 'Domain teams'), under coordination of the System Pillar Core Group.

- Where required, more detailed sector consultation – working circles - will be organized to critically assess the output of the System Pillar teams. The working circles do not have an explicit governance role but are established to achieve broad sector alignment.

On all hierarchical levels of the decision-making process a balanced sector representation shall ensure that developed and fully considered positions are put forward to the System Pillar Steering Group and to the Governing Board.

The figure below illustrates the **first level operational breakdown structure** within the System Pillar:
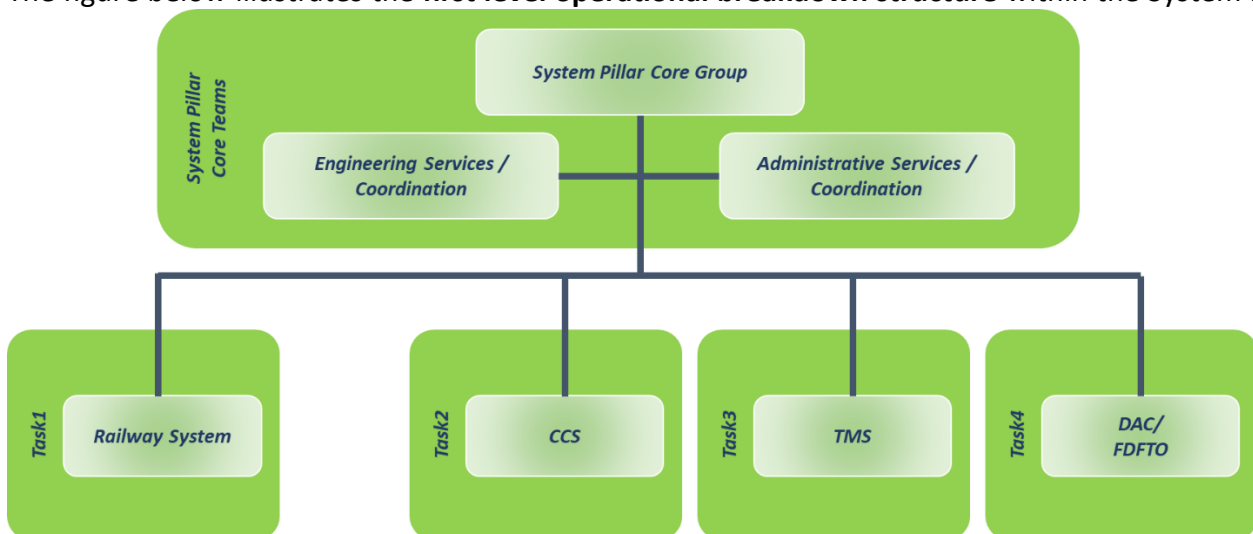
The roles and responsibilities of the following SP groups are depicted in Annex H:

- SP Steering Group, Core Group,
  Engineering Services / Coordination (comprising Central modelling service, Standardisation and TSI input planning, External Architectural support, PRAMMS Management and Assurance),
- Administrative Services (comprising Programme Office, Economic Analysis),
- Task 1: Railway System,
- Task 2: (Advanced) CCS system design,
  - The cross-cutting domain teams (comprising Operational Design, Architecture and release coordination and Migration and roadmap),
  - The CCS System Design Teams (comprising Traffic control and supervision, Trackside assets control & supervision, Train control and supervision, Transversal CCS component, Filed force CCS application, Communication team, Computing environment),
- Task 3: TMS system design,
- Task 4: DAC/FDFTO[10] System design.

3.2.1 The System Pillar Decision Making Process

Decision making is a hierarchical process during the system design, from the lowest (technical) level (Domain Teams) to the highest level (Governing Board)

Decision preparation in the System Pillar Domain Teams and the Core Group

- Domain Teams and Core Group are preparing decisions to be validated on System Pillar Steering Group and Governing Board level
- **Decision-making** in the **Domain Teams** is taken by **unanimous consent of the domain teams (based on exhaustive discussion in the Domain Team).**
  - Where no consensus is reached, the Domain Team lead follows the mediation process via the SPC team
- **Decision-making** power for the **System Pillar Core Group** is based on the **views of the Chair and Members.**
- [The recommendations of the System Pillar Core Group shall be adopted by consensus of the Chair and Members
  - Where no consensus is reached, the Head of System Pillar Unit shall prepare a report for the System Pillar Steering Group, outlining the key common points and diverging views]

| SP Domain Teams |
| SP Cross-cutting Domain Teams |
| SP Core Group |
| ERJU SP Unit |
| SP Steering Group |
| Governing Board |

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[10] DAC = Digital Automatic Coupler / FDFTO = Full Digital Freight Train Operations (part of FA 5 project)

> - o The ED will avail itself of the ED-SIPB in the process of preparation of the Decision for the SP-STG and finally of the GB. The ED-SIPB will also be used for change-management processes at Programme level – see Chapter 10.
>
> Decision making in the System Pillar Steering Group and the Governing Board
>
> - **Decision-making power** for the **System Pillar Steering Group** is based on the **views of the Chair and Members**
> - The recommendations of the System Pillar Steering Group shall be adopted by consensus of the Chair and Members
>   - o **Where no consensus is reached**, the Executive Director of the Europe's Rail Joint Undertaking shall prepare a **report for the Governing Board**, outlining the key common points and diverging views.
> - At the **Governing Board**, a decision shall be deemed **adopted by a majority of at least 55%** of the votes including the votes of representatives who are absent in accordance with Article 8 of the SBA.

3.3 The System Pillar / Innovation Pillar Interaction

The System Pillar and Innovation Pillar of EU-RAIL will work together to deliver a coherent output from EU-RAIL.

The System Pillar aims to provide the Innovation Pillar, where relevant, with a set of requirements aligned with the SP work, in order to ensure that research is targeted on commonly agreed and shared customer requirements and operational needs, compatible and aligned to the defined system architecture. Reciprocally, the Innovation Pillar will impact the scope of the System Pillar where new technologies or processes mean that innovations can drive a change in approach, as well as delivering detailed specifications and requirements. Accordingly, the SP considers results to be expected from the IP in its architectural works.

The high-level principles of the working arrangements and the relationship between the pillars are set out in the following diagram:

SP

Overall operational concepts

Overall system architecture
- functional, logical, physical
- Data structure and semantic rules

Standardisation and TSI input plan

Interfaces to be harmonised;
specs/standards to be developed
- Interface: High level FIS
- Module: FRS

Integration
- Operation outputs
- System architecture outputs
- Specifications/standards

High level migration strategy

New technologies impacting SP

Coordination of engineering strategies

High level CCS+ architecture and operational concepts

IP developments linked to operational requirements and architecture

Interfaces and requirements

Migration aspects

IP

Operational requirements for specific topics

Architecture
- Detailing level of architecture for specific modules.
- Data formalisation & modelling.
- Platforms, Specifications and Processes

Development of processes and technologies

Interface: FFFIS
Module: SRS

Testing and validation of solutions

Development of individual Migration roadmap

Flagship area 1...n

Figure 5 - Relationship between the Innovation Pillar and the System Pillar

The principle of interaction is that the System Pillar proposes the architecture and operational concept. The System Pillar will coordinate specification work of the architecture (including FFFIS and SRS), according to the specification needs. Thus, the Innovation Pillar will develop the technologies and innovation solutions including, when relevant and if in line with IP objectives and scope, the more detailed FFFIS & SRS of the specific systems. The detailed specifications will be verified by the System Pillar to ensure consistency with the overall architecture and operational concept. The responsibility for consolidating and proposing technical documents according to the Standardisation and TSI Input Plan is with the System Pillar. This will enable integration of the flagship projects both together and within the overall proposed system architecture.

From the results of this joint work, the SP will update the Standardisation and TSI input plan with those draft specifications e.g. FRS, SRS, FIS, FFFIS that will allow the next iteration of the future rail system through the ERA CCM process to achieve the ambition of EU-Rail.

3.3.1 The Flagship Projects System Experts (FPSE)

In order to deliver a coherent output from EU-RAIL, the System Pillar and the Innovation pillar will work together as an integrated programme team.

The Innovation Pillar Flagship Projects will have to nominate System Experts as contact point for the System Pillar. These System Experts will have the mandate to discuss system-level topics and will be responsible to create an alignment between the concerned consortium of the flagship project and the system pillar. It is the responsibility of the System Pillar Core Group to extend the relevant meetings to the relevant FP System Experts as required. In case there is a need for Innovation Pillar internal alignment across Flagship projects, the FP System Experts will manage the alignment together with

their Flagship Project Programme Manager and serve as single point of contact towards the system pillar for their Flagship Project.

3.4   Working with ERA

The EU-Rail JU should ensure a close collaboration with the European Union Agency for Railways (hereafter "ERA"), considering Article 40 of Regulation (EU) 2016/796 of the European Parliament and of the Council, and Article 98 of the SBA. In accordance with the latter, that collaboration shall consist of the following advisory tasks:

(a) input on research needs relating to the realisation of the Single European Railway Area for consideration by the Europe's Rail Joint Undertaking in the Master Plan and its amendments as well as in the work programmes;
(b) feedback and advice on interoperability and safety to be considered in the research innovation activities and, more specifically, in the context of project activities and results for the objectives identified in Article 86(5), point (a);
(c) support to the Europe's Rail Joint Undertaking in identifying needs for any additional specific validation or studies to be performed by it, including via the involvement of national safety authorities;
(d) provide advice as regards the System Pillar;
(e) ensure that the development of specifications including interfaces, functional requirement specifications, and system requirement specifications takes into consideration the experience and feedback on TSI or standards.

EU-Rail regularly informs ERA on matters relevant to their advisory role, through:
- ERA participation in the SP Core Group
- Bilateral monthly (indicatively) meetings at EDs level;
- Regular email exchanges;
- Ad-hoc coordination meetings and conference calls.

Representatives of ERA shall be invited to attend the meetings of the Governing Board as observers and participate in its deliberations but shall not have the right to vote. In addition, ERA will be represented in the System Pillar Steering Group. The recommendations of the System Pillar Steering Group will be adopted by consensus, but where consensus is not reached, the EU-Rail Executive Director will prepare a report to the Governing Board, in consultation with ERA and the Commission.

ERA also provides inputs to the Work Programmes as indicated in section 2.3 of this document.

Taking into account the above and in order to ensure that the results from the EU-Rail projects do not encounter a regulatory blocking point because of their novelty, EU-Rail has defined with ERA and DG MOVE a process for collaboration at project level, as follows:

1. EU-Rail will provide the possibility to ERA representatives to attend the evaluation of the call proposals as observers. ERA does not have the voting right but has the possibility to access the relevant documentation and provide the JU and the independent evaluators with feedback on the aspects related to interoperability and safety included in the proposals;
2. ERA will provide to EU-Rail, in principle within 2 calendar weeks after the GB approval of the list of actions/projects selected for funding, "*the level of desired involvement*" in those projects within the scope of its activities[11];
3. EU-Rail will discuss the involvement of ERA in the indicated projects with the relevant Project Coordinator to ensure that their participation can be considered appropriate. This should be defined during the Grant Agreement Preparation (GAP) phase, as far as possible;
4. ERA will provide to EU-Rail the name and contact details of the ERA representative who will be following up on the indicated projects;
5. EU-Rail will provide the possibility to ERA representative(s) to attend the respective Project Kick-off meeting and may involve them as observers during the Review meetings or Projects checks. If so, ERA may also be requested to provide written advice on specific Project deliverables or reports.

The level of desired involvement is defined as follow:

0	ERA has minimal direct interest/competence and does not attend any meeting, conference, seminar, workshop or any other event organised and managed by EU-Rail research project management.
1	ERA attends at least one of the major events organised and managed by the EU-Rail research project, e.g. kick-off, final conference, mid-term meeting or workshop.
2	ERA follows on a regular basis open meetings organised and managed by the EU-Rail research project, considering also possible variance of interest at work package level. ERA follows the discussion and has knowledge of the research project management activities.
3	ERA shows particular interest in the research project due to the specific match with its competence, considering also possible variance of interest at work package level. In particular ERA follows the development of results by attending meetings and may act in a particular role, e.g. member of an advisory board. Within its remit as authorising entity, ERA will support the relevant project activities as needed.

For the level of involvement "2" and "3" EU-Rail will discuss bilaterally with the Project consortium during the GAP and identify on a case by case basis the Work Packages and the respective meetings in which ERA could be directly involved, as well as for which access to project documentation would be granted. This involvement should be formalised, including the possibility to assign to ERA a specific

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[11] see Annex E

role within the project (e.g. member of an advisory board), as far as possible in the project Grant Agreement preparation.

If during the course of the project ERA concludes that a different level of their involvement within the project is necessary than initially estimated, this will be communicated to EU-Rail and followed by the same procedure as mentioned above, meaning that EU-Rail will discuss the matter with the Project Coordinator.

In case ERA is interested in gaining access to Project documentation to which they not yet have it, or to which access is not yet available (because not yet submitted as deliverable), ERA will provide the request for such access to EU-Rail. ERA will explain the need, possible time constraints and any other information that is important and should be taken into account. EU-Rail will agree with ERA the most appropriate course of action and will discuss it with the Project Coordinator.

For the Flagship Projects using the EU-Rail platform, the JU, in agreement with the Project Coordinator, may give access to ERA to the tool, in its entirety or partially for a certain project, to enable provision of its support to the respective project within the defined level of interest.
ERA will have access to the Horizon Europe management tool (Compass/SyGMa) for the EU-Rail projects of its interest.

The ERA staff is subject to the Provisions of the Union Staff Regulations and in particular specific obligations in terms of confidentiality and non-disclosure in the performance of their duties, also after the end of their work contracts.

In a reciprocal manner, EU-Rail will be attending the relevant ERA Committees working groups, and , subject to a prior approved request, the EU-Rail ED will participate participate as observer to the ERA Management Board meetings, in particular when matters related to the scope of activities of the JU are on the meeting agenda. Also, EU-rail staff members are participating to the ERA internal Research Steering Group and ERA working groups.

EU-Rail will also provide representatives (from among its staff or Members) to the ERTMS Stakeholders' Platform meetings at Board level as well as in the relevant subgroups of the Platform created for addressing specific topics. The Coordination subgroup of the ERTMS Stakeholders' Platform may also be considered.

This initial setup should be further considered in the future to avoid overlapping between design and R&I of innovative solutions and their certification and authorisation.

In addition, ERA will also provide access to the nominated EU-Rail representatives to other relevant committees linked to CCS activities (including ERTMS/ETCS), such as the ERA CCS Working Party or the

ERA ERTMS Control Group, or any other relevant groups for example related to the DAC TSI implementation.

ERA will also provide access to the EU-Rail staff members to its Extranet and calendar of activities.

ERA will add in their relevant distribution lists the nominated EU-Rail staff members, ensuring the proper dissemination of the activities and information on workshop/events.

ERA will also request the EU-Rail staff members to attend their internal RSG (Research Steering Group), to ensure full alignment of activities.

3.4.1 ERA in the System Pillar

ERA will assess, being the System Authority for ERTMS and Telematics Applications, in its full independence and autonomy, if the output of the System Pillar meets the criteria of interoperability, safety and security (via ENISA) established by the legislator, by:
- formulating requests and clarifications to the System Pillar Steering Group on progress and output;
- raising to the Europe's Rail JU and the European Commission concerns where developments may run counter to the objectives of interoperability, security and safety;
- providing recommendations to the European Commission as result of its assessment, proposing the relevant amendment to the existing TSIs, expanding their scope or proposing the introduction of any new relevant regulation that would underpin the implementation of the aforementioned output.

Once agreed and positively assessed, or mandated by the European Commission, ERA manages the outputs from the System Pillar into the TSI according to their internal working arrangements (e.g. of the ERA Extended Core Team), and the recommendation to the European Commission.

Such recommendations and proposals in no manner can be considered to construe a position of ERA with regard to its specific roles of authorisation of vehicles, issuer of safety certificates, in the collection of the ESC, and in the ERTMS Trackside Approval, but it aims to facilitate the sectoral agreement and should result in a faster acceptance process at ERA level if no interoperability, security and safety concerns are detected through the entire process.

ERA will contribute to the work as advisor to the JU, while safeguarding its independence, by contributing to the identification of:
- the detailed scope of the work and its possible structure;
- end-user needs;

- the strategic view of the major functionalities/changes to be introduced on the basis of the target operational concept and system architecture;
- relationship and change management on relevant TSIs;
- standardisation, studies, etc. needs to achieve the System Pillar objective;
- the management of compatibility of systems over time, maintaining acceptable level of performance.

In this context ERA will contribute to the developments of the operational concept, system architecture and of the "Standardisation and TSI input plan".

Where there is a need to ensure adaptation of the TSIs, due to the commonly agreed system impact from the activities of the SP:
- either a System Domain of the SP will be activated with a dedicated task to contribute to the ERA successive validation processes,
- or a Topical Working Group (TWG) may be set up

whichever process will be commonly agreed, with the European Commission, as the most efficient.

The System Pillar will support ERA
- in its consideration of TSI enhancements in the scope of the JU;
- in its role as ERTMS and Telematics System Authority:
  - o validating and checking enhancement change requests in the scope of TAP/TAF, CCS enhancements external to the JU. Such enhancements will be passed to the System Pillar from ERA to assess against the overall system architecture and operational concept, and inform ERA in its further consideration of such enhancements;
  - o validating and assessing CCS associated error corrections;
- providing input to a TWG.

3.5 Working arrangements with International and European Standardisation Organizations (ISO, IEC and ESO)

The System Pillar will manage Standardisation activities from the JU towards European and International Standardisation Organizations, while applying these principles:

- Ensure a coordinated approach for the JU, System Pillar and Innovation Pillar;
- Ensure early uptake of new findings in Innovation process to standardisation activities;
- Prevent overlapping and contradictory or conflicting standardisation activities within and outside the project;
- Enable smooth and swift standardisation process through regular communication on priorities and synergies with standardisation bodies and through early identification of blocking points;

- Ensure the development of the right standard at the right place on the right time, with close cooperation with the European and International standardisation bodies, notably through the working groups setup by the European Commission for this purpose (e.g. RASCOP).

The System Pillar will therefore coordinate standardisation activities stemming from the JU's activities at least with the following bodies (the list is non exhaustive and may be enlarged depending on the coverage of the R&I outcomes):

- European Standardisation Organisations:
  - The Railway Technical Committee of the European Committee for Standardization: CEN TC 256;
  - The Railway Technical Committee of the European Committee for Electrotechnical Standardization: CENELEC TC 9X;
  - The Railway Technical Committee of the European Telecommunication Standard Institute: ETSI TC RT.
- International Standard Organisations:
  - The Railway technical committee of the International Organisation for Standardisation: ISO TC 269;
  - The Railway technical committee of the International Electronical Commission: IEC TC9;
  - The International Telecommunication Union (ITU).

The responsibilities of the System Pillar with regard to the subject matter are the following:

- Collecting standardisation proposals from System Pillar Domain Teams system design activities or external enhancement proposals, as well as collecting standardisation proposals from the Innovation Pillars Flagship Areas;
- Analysis and assessment of standardisation proposals and needs while maintaining the Standardisation and TSI Input Plan;
- Validation of standardisation and TSI Input Plan with the System Pillar Steering Group;
- Providing relevant input to the different standardisation bodies and to the Commission Standardisation request.

4 Roles and responsibilities of the JU team members

This section describes the roles and responsibilities of the JU staff accountable for the successful implementation of the EU-Rail Programme. The JU's key contact persons are listed in Annex B.

The JU Programme Office is organized upon recommendation of the Executive Director in a manner enabling the delivery of the EU-Rail Programme, while mirroring the provisions of the SBA. This internal organization, as depicted in the chart below, was presented by the Executive Director to the EU-Rail GB in its first meeting held on 21 December 2021 and was acknowledged by the GB.

EU-Rail is organized in Units managed by their Heads, complemented with some other functions reporting directly to the Executive Director. The Programme activities are divided into two Units: the Innovation Pillar and the System Pillar. The Head of the System Pillar subunit reports to the Executive Director, but he/she also remains functional reporting to the Head of Programme.

The Programme management falls under the remit of the Head of Programme, who reports to the Executive Director, and has direct responsibility for the Innovation Pillar, while ensuring coordination with the System Pillar as well. The Head of Corporate Services reports to the Executive Director, and is responsible for providing the necessary financial, administrative and compliance support in relation to the activities of the JU. Other functions of the Programme Office, such as the Internal Control Coordinator, the HR Officer and the Chief Officer for Stakeholders' Relations and Dissemination, report directly to the Executive Director.
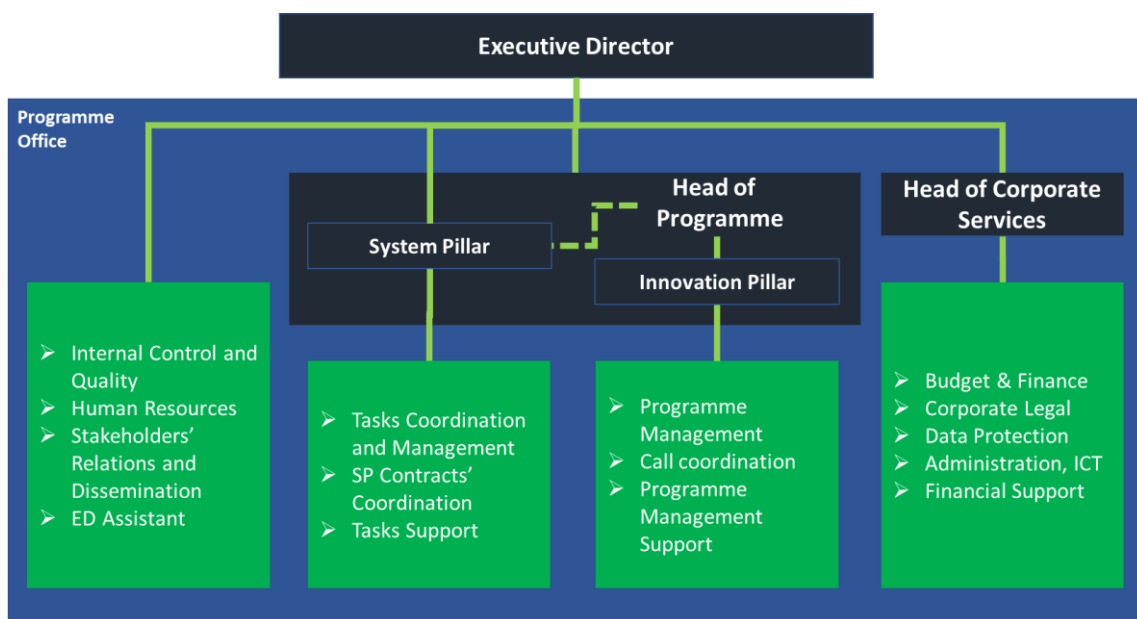

Figure 6 - EU-Rail organisational structure of the Programme Office

The EU-Rail **Management Team** meets usually several times in a week in a composition enlarged by other staff members who are in charge of horizontal agendas. More specifically, the meetings include the Executive Director, the Head of Programme, the Head of Corporate Services, the Head of the System Pillar Unit, the Chief Officer for Stakeholders' Relations and Dissemination, the Internal Control Coordinator, the HR Officer and the Assistant of the Executive Director.

On a weekly basis, a **Staff Meeting** takes place where each Staff Member is invited and provided with the opportunity to ask the management about any topic, or to share with other colleagues their experience or any issues of common interest. In these meetings, each manager presents information on current activities and events that are relevant to the JU or that are critical for the performance of their own areas of responsibilities.

The Head of Programme convenes a weekly meeting of covering both the **System Pillar Unit** and **Innovation Pillar** Unit; similarly, the **Head of Corporate Services** organises weekly meetings for the staff reporting to him/her.

4.1   Research and Innovation

The **Head of Programme** (HofP) reports to the Executive Director of EU-Rail. He/she is responsible for the Innovation Pillar and is also entrusted with the coordination of the Programme, in particular the two Pillars. The implementation of the Programme shall be in compliance with the internal control framework of the JU. The **HofP** should perform the following:

- Contribute to the design and implementation of the EU-Rail Programme and its evolution, in accordance with the strategic direction established by the Executive Director;

- Be responsible for the Programme coordination and integration of the activities performed under the System and Innovation Pillars, interfacing with the **System Pillar HoU**, delivering R&I outputs defined in the Multi-Annual Work Programme and in the Work Programmes;

- Be responsible for the Innovation Pillar activities and managing/organising tasks in particular, with the possible support of a deputy;

- Supervise and ensure the effective and efficient implementation of the EU-Rail Programme, its continuous coordination with the **Head of Corporate Services**, including the overall grant process, from the planning to the closure of grants, providing the necessary information for the corporate reporting;

- Contribute to building synergies and appropriate relation with other EU and national programmes, in respect of R&I as well as future deployment activities;

- Provide input to support the EU policies, balancing the public and private interest of the PPP;

- Develop the competences and skills of the personnel reporting to her/him and evaluate their performance;

- Represent, as delegated, the JU Programme in meetings, working groups, conferences, etc.;

- Keeping constructive and professional relations with the EU-Rail Members and stakeholders, as relevant;

- Foster a culture of leadership by example – tone at the top – starting from the "EU-Rail ingredients", towards a culture promoting highest ethical standards in the workplace.

The HofP is supported by an **Administrative Assistant**, who will provide support to the Programme in its entirety, with the following responsibilities:

- Assist the **HofP** in ensuring the follow-up of unit meetings and agreed assignments;

- Provide secretarial support by taking notes, keeping up-to-date the EU-Rail calendar and mailing lists, contact databases, answering and filtering phone calls, taking messages, responding to general inquiries and managing e-mail exchanges;

- Provide support in the preparation and reporting of duty travels for the Unit staff or as back-up of other assistants;

- Participate in the planning of logistics needs;

- Assist other staff members of the Unit in ad hoc tasks upon request, subject to the agreement of the HofP;

- Maintain well organized filing in accordance with the Document Management System;

- Contribute to administrative quality checks on files for signature;

- Receive guests and prepare meetings organized by the Unit's staff or the JU;

- Provide administrative and logistical support for the organization of internal and external events such as meetings, workshops, conferences, consensus weeks and public events;

- Subject to the gradual learning curve, become a back-up of the Call Coordinator;

- Other tasks might be considered in agreement with the **HofP**, if in the interest of the JU.

The **Call Coordination and Programme monitoring Officer,** reporting to the HofP, covers the following agenda:

- Manage the lifecycle of calls in particular in terms of call preparation, publication, evaluation, selection and award in compliance with applicable rules of HE and EU-Rail processes;

- Be responsible for the selection, contracting and managing of independent experts (in collaboration with the colleagues in charge of the respective project), for the purposes of the evaluation of proposals, as well as for the project reviews or specific issue reviews;

- Act as the liaison between the JU and the HE EC support services and follow the EC research family relevant transversal groups;

- Contribute to the implementation of EU-Rail obligations in relation to the dissemination of project results, in particular in ensuring an up-to-date project results information on the website and newsletters, to be provided to the Stakeholders' Relations and Dissemination Officer and/or to the contractor;

- Coordinate and monitor the Grant Agreement Preparation Phase with regard to the achievement of its conclusion within the set Time-to-Grant target;

- Develop, prepare and maintain the Programme's dashboard, in view of planning and reporting, as well as for following up on the JU's KPIs;

- Develop and maintain the EU-Rail Programme templates;

- Contribute to the definition and maintenance of the EU-Rail Governance and Process Handbook;

- Based on the input provided by the responsible Programme Managers, maintain decisions, issues and risk register;

- Keeping constructive and professional relations with the EU-Rail Members and stakeholders, as relevant;

- Other tasks might be considered in agreement with the **HofP**, if in the interest of the JU.

The **Grant & Legal Officer** supports the Programme on compliance aspects related to grants in relation to the specific implementation in the rail environment, considering the integration between the System and Innovation Pillars. In this role, she/he also provides support to the Joint Undertaking bodies, established as per the SBA provisions. She/he reports to the Head of Programme and has the following responsibilities:

- Ensure compliance of the grants' lifecycle and provide support to the rail-related R&I activities, mainly by:
    - o Managing during the proposal evaluation stage the eligibility checks, experts' conflicts of interest and ethics evaluation processes;
    - o Providing during GAP/GA the necessary compliance checks, assessment and follow-ups, as verifying compliance of beneficiaries and third parties to EU-Rail rules and Programme framework;
    - o Providing necessary support to the Programme team on grant-related questions and provision of necessary compliance advice or documents;

- Provide appropriate support to the EU-Rail governance bodies, mainly by organizing meetings; drafting Decisions for adoption; drafting amendments, liaise with group members;

- Liaise with other JUs in relation to grant implementation and compliance, as well as with the relevant services;

- Keeping constructive and professional relations with the EU-Rail Members and stakeholders, as relevant;

- Other tasks might be considered in agreement with the **HofP**, if in the interest of the JU.

The Innovation Pillar is headed by the **HofP** and is organized in a two-layer structure, with the Senior Programme Managers leading the Programme Managers teams organized around the Flagship Areas established in the Multi-Annual Work Programme.

The **Senior Programme Managers** report to the **HofP**.

The Senior Programme Managers ensure that an integrated set of R&I activities is designed to achieve a system impact – taking into account EU-Rail system requirements – measured with one or more demonstrators, with input to the legislator and with continuous visible outputs. With their role, they support the **HofP** contributing to the design and implementation of the EU-Rail R&I Programme.

Each Senior Programme Manager supervises and manages her/his Team of Programme Managers.

The **Senior Programme Managers** have the following responsibilities:

- Support the **HofP** in contributing to the design and implementation of the EU-Rail R&I Programme;

- Manage and coordinate the overall progress of the R&I Area for which they are responsible.

- Supervise and manage the **Programme Managers**' assignments in particular for Flagship Projects activities, ensuring that the research outcomes and demonstrations are delivered as planned in the Multi-Annual Work Programme and the impact is in line with the Master Plan, with the required quality and maturity (including performance expectations) and undertaking, if needed, appropriate corrective measures;

- Ensure that Flagship Projects are taking up upon the System Pillar requirements and do contribute to the definition of interfaces leading to a European rail system architecture that is implementable and allows for innovation take up;

- Provide input, draft, ensure the quality of the Calls for proposals, tender specification and/ or request for services, coordinate and run the technical evaluation, ensure the finalization of the process up to the signature of the relevant agreement directly or by supervising the relevant **Programme Managers**;

- Organise and coordinate projects progress reviews and other verifications, in particular, managing the Maturity checkpoints with the relevant experts in view of assessing the Flagship Project activities maturity progress (TRL), alignment on requirements, architecture and achievable performance towards the Programme objectives;

- Ensure an effective and efficient implementation of the Flagship Areas and Transversal Topic activities interdependencies, as well as any other synergies with other projects, JUs, PPPs or national activities;

- Be responsible for the assessment of the Projects results and implementations, including the 'certified correct' for payments and/or supervise the work of the **Programme Managers** in this respect;

- Manage the risks linked to the Innovation Pillar activities, including their relation with the System Pillar activities;

- Ensure efficient coordination with **Project Managers** in order to steer them towards EU-Rail expectations and delivery upon harmonised processes and approaches;

- Provide monthly reporting required to establish and maintain an accurate view of the status of the Projects to support the **HofP** in contributing to the corporate reporting of the JU, as well as report as requested to the relevant JU governing bodies, prepare replies to EC policy requests;

- Participate as needed to project meetings/activities within the remit of funding authority, in particular for monitor purposes;

- Supervise the project execution of dissemination & exploitation activities, in particular, ensure the harmonised and quality input for standardisation and regulation as well as their technical KPIs and Impacts;

- Contribute to the promotion of EU-Rail activities in line with the established communication strategy;

- Act as Business partner and keep constructive and professional relations with the EU-Rail Members and stakeholders, as relevant;

- In the absence of a **Programme Manager**, the Senior Programme Manager will take the responsibility of the projects under the PM responsibility;

- Take on additional tasks, in agreement with the **HofP**, as required in the interest of the JU.

The **Programme Managers** report hierarchically to the **HofP**; they are organized into R&I Areas Teams supervised and managed by a Senior Programme Manager. With regard to performance assessment, the HofP will request the respective Senior Programme Manager to provide the necessary input in relation to the performance of a Programme Manager, or will delegate the assessment to a Senior Programme Manager directly. The Programme Manager is in charge of the following:

- Support the **Senior Programme Manager** by contributing to the design and implementation of the EU-Rail R&I Programme;

- Conduct the continuous assessment of the Projects, with the support of external experts as needed and focusing on the objectives to be reached, assessment of projects deliverables and milestones and their alignment with the respective grant/procurement contract;

- Follow-up on projects implementation, monitoring contractual obligations via the supervision of reporting activities, conducting checks and reviews, attending project meetings and dealing with amendment requests in a timely manner and in accordance with the H2020 and HE rules and maintain an overview of the progress and financial expenditures of projects;

- Contribute, under the supervision of the **Senior Programme Manager**, to the calls for proposals, tender specification and/ or request for services, the technical evaluation and the finalization of the process up to the signature of the relevant agreement;

- Contribute, under the supervision of the **Senior Programme Manager**, to the assessment of the Projects results and implementations, including the 'certified correct' for payments;

- Monitor and control the projects' achievements against the grant agreement, including the communication, dissemination & exploitation activities, monitor the projects' technical KPIs, their impact and input in relation to standards and regulations ensuring their timely delivery;

- Ensure that EU-Rail has all the necessary and up to date information on the status of the projects (e.g. with project planning, progress reports with resources and budget, amendments, etc.) in support to the monthly report of the **Senior Programme Manager**, required to establish and maintain an accurate view of the status of the action;

- Verify quality of the information on risks reported in relation to the projects and support the **Senior Programme Managers** in identifying the necessary mitigation measures or actions at S2R/ EU-Rail Programme level;

- Contribute to the promotion of EU-Rail activities in line with the established communication strategy;

- Prepare input for the EU-Rail bodies, support the preparation of replies to EC policy requests, draft reports and meeting minutes;

- Act as business partner and keep constructive and professional relations with the EU-Rail Members and stakeholders, as relevant;

- Take on additional tasks indicated by the **Senior Programme Manager** in charge, in agreement with the **HofP**, as required in the interest of the JU.

4.1.2 The System Pillar

The System Pillar is headed by a Head of Unit.

The **Head of System Pillar Unit** reports to the ED; to ensure the overall R&I Programme Coordination, a functional reporting line to the **HofP** is established. He/she is responsible for the following:

- Contribute to the design and implementation of the EU-Rail Programme, with particular responsibility for the System Pillar and its evolution, in accordance with the strategic direction established by the Executive Director;

- Be responsible for the System Pillar activities and managing/organising the related tasks;

- Ensure the efficient and effective undertaking of the System Pillar activities, delivering upon the Master Plan objectives;

- Organise the System Pillar Steering Group and monitor the follow-up (e.g. actions);

- Manage the System Pillar Core Group;

- Ensure that the Unit contributes to the preparation of the calls for proposals, tenders specifications and request for services, to the technical evaluation of the proposals/tenders and to the finalisation of the relevant agreements;

- Manage the implementation of actions under the System Pillar ensuring resources are used in the most efficient, effective and economic manner;

- Supervise the execution of exploitation activities and, in particular, ensure the strategic planning and implementation of the EU-Rail "Standardisation and TSI input plan";

- Organise the allocations of tasks to **SP Programme Managers**;

- Manage the risks linked with the System Pillar activities, including their relation with the Innovation Pillar activities;

- Develop the competences and skills of the personnel reporting to her/him and evaluate their performance;

- Represent the System Pillar in meetings, working groups, conferences, etc., as requested and delegated;

- Keeping constructive and professional relations with the EU-Rail Members and stakeholders, as relevant.

- Foster a culture of leadership by example – tone at the top – starting from the "EU-Rail ingredients", towards a culture promoting highest ethical standards in the workplace.

The **SP Programme Managers** report to the HoU System Pillar and have the following responsibilities:

- Conduct the continuous assessment, focusing on the objectives to be reached, of contracted services.

- Ensure timely outputs and proper administration of experts and control of projects outcomes and milestones with their alignment with the respective grant/procurement contracts;

- Follow up on projects/service contracts implementation, monitoring contractual obligations via the supervision of reporting activities, conducting checks and reviews, attending meetings and dealing with amendment requests in a timely manner and in accordance with HE and EU Financial rules and maintain an overview of the progress and financial expenditures of projects;

- Contribute to the calls for proposals, tender specification and/or request for services, the technical evaluation and the finalization of the process up to the signature of the relevant agreement;

- Contribute to the assessment of the projects results and implementations, including the 'certified correct' for payments;

- Monitor and control the projects' achievements against the agreement, including the communication, dissemination & exploitation activities, monitor the projects' technical KPIs, their impact and input in relation to standards and regulations ensuring their timely delivery;

- Ensure that EU-Rail has all the necessary and up to date information (e.g. with project planning, progress reports with resources and budget, amendments, etc.) required to establish and maintain an accurate view of the status of the action;

- Verify quality of the information on risks reported in relation to the projects and identify the necessary mitigation measures or action at S2R/EU-Rail Programme level;

- Contribute to the promotion of EU-Rail activities in line with the established communication strategy;

- Prepare input for the EU-Rail bodies, including support in the preparation of replies to EC policy requests, and draft reports and meeting minutes;

- Act as business partner and keep constructive and professional relations with the EU-Rail Members and stakeholders, as relevant;

- Take on additional tasks, as indicated by the **Senior Programme Manager** in charge and in agreement with the **Head of System Pillar Unit**, as required in the interest of the JU.

4.2 Corporate Services

The **Head of Corporate Services** (HoCS) reports to the Executive Director of EU-Rail. The Head of Corporate Services carries overall managerial responsibility for financial and administrative issues. More specifically, the HoCS is responsible for the following activities:
- Ensure the coherence among the work elements assigned to the Administration;
- Manage the EU-Rail budget (annual budget preparation and presentation, follow-up and co-ordination, monitoring of expenditures, preparation of reconciled financial reports, etc.);
- Tendering and contracts management, including contract laws and regulations;
- Infrastructure and facilities management;
- Overall security matters, including physical and cyber-security;
- Maintain a harmonized knowledge management framework across EU-Rail;
- Develop the competences and skills of the personnel reporting to her/him and evaluate their performance;
- Lead the effective and efficient implementation of EU-Rail's internal control framework.

4.2.1 Finance team
The Finance team reports to the **Head of Corporate Services** of EU-Rail. The finance team covers a wide range of activities, from the basic financial statements to providing clear information to assist management in making strategic decisions, as well as being responsible for managing cash flows and ensuring sufficient funds are available. In particular, the finance team carries out the following tasks:
- Financial initiation of transactions, i.e. invoices, cost statements, payments, in-kind contribution declarations, etc.;

- Financial support to the EU-Rail operational activities (including assisting **Programme Managers**, analysing financial viabilities and following up on financial implementations of grants);
- Advice on financial practices in line with the EU-Rail budgetary, financial and contractual rules;
- Provide assistance for control and audit missions;
- Prepare financial reporting tables and reports.

4.2.2 Chief Legal officer

The Chief Legal Officer reports to the **Head of Corporate Services**. His/her role is to ensure the legal soundness of the actions and decisions of EU-Rail, in the specific context of rail research and innovation, rail market and sector knowledge and membership. In addition to overseeing the work of the legal support function, the Chief Legal Officer is responsible for the following:

- Procurement and other legal administrative issues, in relation to the rail research and innovation programme, IP and SP;
- Monitor the implementation of applicable rules, regulations and procedures within the JU;
- Advise management and staff on the validity and conformity of procedures with the applicable rules and regulations, to ensure the legality and regularity of the implementation of the rail R&I programme;
- Improve quality and consistency of the JU's outputs from the legal point of view;
- Provide legal analysis and advice in support of EU-Rail policies and inputs to DG MOVE policy making;
- Advise management on possible litigation risks and contribute to find solutions to avoid litigation;
- Ensure the follow-up of litigation in liaison with the relevant services such as the Commission's Legal service, the Ombudsman and OLAF;
- Contribute to the production of manuals for management and units on legal and procedural issues;
- Deal with issues relating to protection of data and access to documents in the JU.

4.3 Flagship Project Manager

Each Flagship Project shall be set up in accordance with the respective grant agreement requirement, i.e. a Project Coordinator representing the Consortium which shall carry out the necessary duties.

Building upon the experience of the S2R JU Projects, EU-Rail considers necessary to avail itself with one dedicated Project Manager per relevant Flagship Project to ensure the cost-effective and efficient delivery of the project, taking into consideration the interdependencies between different Flagship Projects and with the System Pillar and the need to ensure a systemic approach to the implementation of the Programme.

This Flagship Project Manager is contracted by the JU: her/his tasks will be defined by the Executive Director or his delegated representatives, on the basis of the agreement with each Flagship Project Steering Committee. The FP Project Manager shall not undertake any of the tasks of the Project Coordinator. She/he will be reporting to the Steering Committee of the FP as well and called to report at the System and Innovation Programme Board. In addition, the JU will be provided with regular reporting on the performance of the project by the Flagship Project Manager herself/himself.

Where needed and appropriate, the role might be carried out by a dual-leadership or co-leadership, including to reflect properly the involvement of major groups of stakeholders in the performance of the project.

The EU-Rail Programme Manager shall be the first liaison contact point for the Flagship Project Manager; the two roles shall be independent, as the first is entrusted with the responsibilities deriving from the JU as the funding body in accordance with the Financial Rules.

In principle, the Flagship Project Manager will be contracted by the JU by implementing Article 43.4 of its Financial Rules, opening a call to its Founding Members to propose the required Flagship Project Managers, subject to the budgetary availability approved by the Governing Board.

5 RACI matrix

Via a RACI matrix (Table 1), an overview is created of which role is assigned to the respective functions/bodies in performing a certain task or activity.

Actions	GB	ED	Head of Programme	Head of Corporate Services	Head of System Pillar Unit	EU-Rail Private Member expert	Project Coordinator	Flagship Project Manager	System Pillar Core Group	IP System experts	Independent experts	SC	Deployment group	SRG
Content & budget for WP	A	R	C	C	C	C			C	C		C	C	C
Publication of calls		A	R	C	R							I	I	I
Evaluation of proposals		A	R	C	R		I		I		C			
Evaluation of (interim) project results		A	R	R	R		I	C	I		C		I	
Payment to project consortia		A	C	R	C		I		I					
Scope changes to the projects/programme	A	C	R	C	R	C	C	C	C	C		C	I	
Audit preparation	I	A	R	R	R		I	C	I		C			
Verify end deliverables		A	R	R	R		I	C	I		C		I	
IT security		A	C	R	C		C	C	C					
Communication and Dissemination		A	C		C		R	C	R					
Risk management		A	C	C	C		R	C	R	C	C			C
Change management		A	R	C	C	C	C	C	C	C				C
Requirement management	I	I	C		C		R	C	R	C				

Table 1 - RACI matrix

Four types of roles are defined:

- Responsible: "R": Represents the responsibility for ensuring that the activities are completed successfully. In a RACI chart, "R" answers the question: **Who is getting the task done?** This role

is assigned to persons/functions/bodies taking the main operational stake in fulfilling the listed activities and delivering the intended outcome.

- Accountable: "A": The individual, function or body who/that is ultimately responsible for the subject matter, for the process in its full scope. In a RACI chart, "A" answers the question: **Who accounts for the success of the task?**

- Consulted: "C": Refers to those persons/functions/bodies whose opinions are sought in performing an activity (two-way communication). In a RACI chart, "C" answers the question: **Who is providing input?** It is up to the "accountable" and "responsible" roles to obtain information from other units or external partners, too; however, inputs from the listed roles are to be considered and, if required, appropriate action has to be taken for escalation, including the information of the process owner and/or the steering committee.

- Informed: "I": Refers to those persons/functions/bodies who are kept up to date on the progress of an activity (one-way communication) and are informed of the achievements and/or deliverables of the task. In a RACI chart, "I" answers the question: **Who is receiving information?** Those assigned with the "accountable" role, of course, should always receive the necessary information as well to oversee the task, as do those assigned with the "responsible" roles for their area of interest.

6 Planning

Planning is an iterative and collaborative activity for all contributors of the partnership:

- The MAWP sets the high-level planning targets: dates are defined for bringing R&I challenges to given TRLs.
- The preparation of call for proposals requires specific care to anticipate cross-dependencies (e.g. transversal needs such as telecommunication)
- The project execution should follow the planning defined in the grant. Detailed planning elements will be needed to orchestrate expertise and demonstrators (e.g. integration in a project of solutions developed in another Flagship Area)

EU-Rail programme planning should be about breaking down a project in phases and identifying high level milestones in order to facilitate and enable alignment within consortium members and outside (e.g. other Flagship Areas, System Pillar, ERA, ESO). Clear milestones allow for presenting progress and organising timely decision points.

7 Quality Management

7.1 Evaluation of proposals

7.1.1 Evaluation process

The proposals are evaluated according to the Horizon Europe award criteria and must meet the minimum thresholds in order to be funded (See Figure 7). Each proposal has to sufficiently demonstrate its added value in accordance with the award criteria of 'excellence', 'impact' and 'quality and efficiency of the implementation', in order to be funded by EU-Rail.

The evaluation should take into consideration the coherence of the proposal with the MAWP and the WP, which provides a benchmark for the different criteria evaluated (i.e. expected level of technical ambition, expected level of innovation potential, expected level of progress beyond state of the art, or expected level of impact of the proposals).
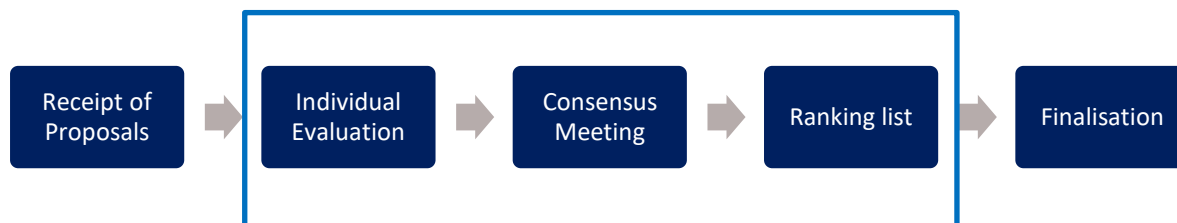
Figure 7 - Evaluation process

After the individual evaluations, consensus meetings are conducted in the different established panels, covering the different Flagship Area themes, which attribute scores (0 to 5) on 3 core capabilities of Excellence, Impact and Measures to maximise the impact.

This consensus meeting is held in Brussels where the different evaluators start their discussion from the individual evaluations. First, an agreement must be found on comments before a final score can be given.

7.1.2 Scoring method

EU-Rail scoring method does not differ in any manner from Horizon Europe; in case of discrepancies, Horizon Europe guidance material prevails. A score between 0 and 5 is awarded to each criterion, as can be seen in Figure 8. In order for a proposal to be considered for funding, scores must pass the threshold of 3 out of 5 on each criterion and the total score of the proposal must be above the overall threshold of 10 out of 15. The criterion Impact is given a weight of 1.5 to determine the ranking.

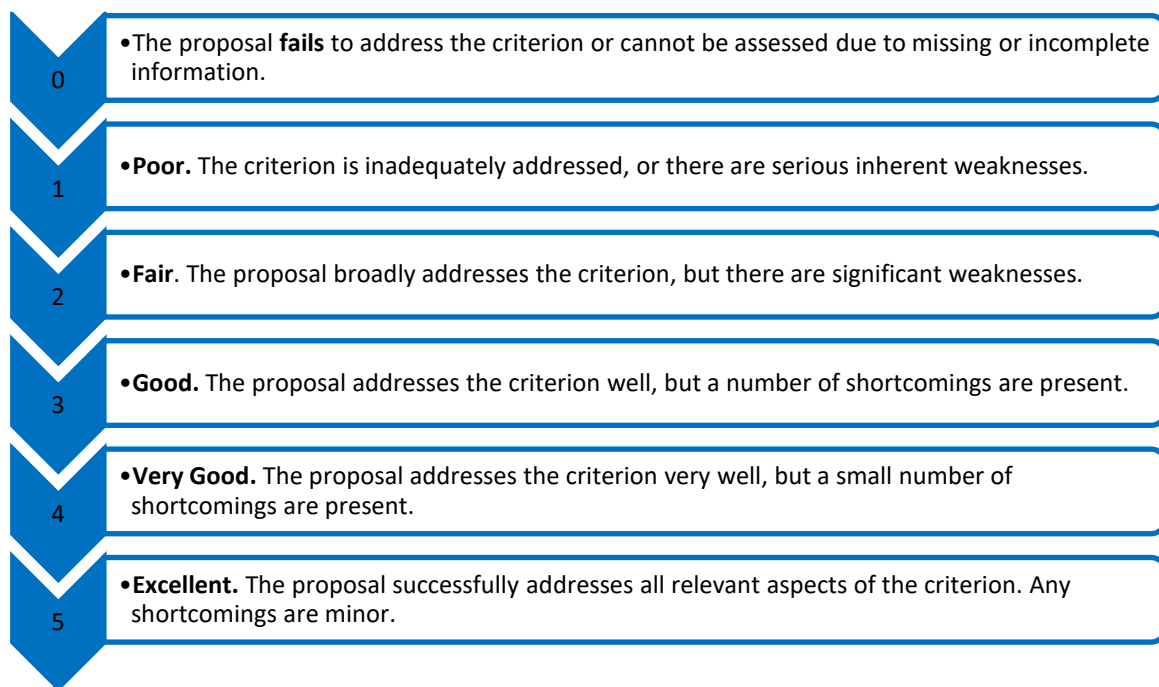All proposals considered for funding are subject to ethics screening and possible assessment.

0	•The proposal **fails** to address the criterion or cannot be assessed due to missing or incomplete information.
1	•**Poor.** The criterion is inadequately addressed, or there are serious inherent weaknesses.
2	•**Fair**. The proposal broadly addresses the criterion, but there are significant weaknesses.
3	•**Good.** The proposal addresses the criterion well, but a number of shortcomings are present.
4	•**Very Good.** The proposal addresses the criterion very well, but a small number of shortcomings are present.
5	•**Excellent.** The proposal successfully addresses all relevant aspects of the criterion. Any shortcomings are minor.

Figure 8 - Scoring scale

7.2   Financial Viability Check

EU-Rail financial viability check does not differ in any manner from Horizon Europe; in case of discrepancies, Horizon Europe guidance material prevails.

A coordinator of a consortium which submitted a successful proposal in answer to a call shall be subject, under certain conditions to a viability check by EU-Rail through the competent Commission Services (Article 27 of the Horizon Europe Rules for Participation)[12].

If there are grounds to doubt the financial capacity of an applicant, or if there is a higher risk due to the participation in several ongoing actions funded by Union R&I programmes, the Commission or the JU shall also verify the financial capacity of other applicants.

In the circumstance where the financial viability is considered weak based on the check result, the JU Finance Team or the Commission may make participation of the applicant conditional on provision of a declaration on joint and several liability by an affiliated entity.

The contribution to the Mechanism set out in Article 37 of the Horizon Europe Regulation shall be considered to be a sufficient guarantee under Article 152 of the Financial Regulation and no additional guarantee or security shall be accepted from beneficiaries or imposed upon them.

7.3 Continuous monitoring

Monitoring is a continuous activity that takes place in various forms throughout the project (and beyond).

In order to ensure good implementation, therefore the projects are monitored on:

- technical: compliance with the description of the action (DoA)
- financial: compliance with the GA rules for the work packages completion and consistency with the annual in-kind contribution declaration (for non-funded eligible costs and/or IKAA linked to the project)
- other: compliance with all other obligations under the grant agreement. In particular, for EU-Rail projects, Article 3 of the GA is of major importance, which specifies that the grant is awarded for an action which aims to implement the FA part of the MAWP and that is 'complementary' to another grant.

The EU-Rail Project Managers are responsible for the monitoring and liaising with other colleagues for legal, financial, or administrative issues. They are assessing the deliverable at any moment before approving the periodic reports (these latter are assessed accordingly to the timeline indicated in the sections 2.4.1 and 2.4.2 of this document).

Beneficiaries are requested to regularly report, in 2 different ways[13]:

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[12] In addition to the exceptions mentioned in Article 198(5) of the Financial Regulation, the financial capacity shall be verified only for then coordinator and only if the requested funding from the Union for the action is equal to or greater than EUR 500 000

[13] Refer to Article 21 of the Horizon Europe General MGA

- **Continuous reporting**: The beneficiaries must continuously report on the progress of the action (e.g. deliverables, milestones, outputs/outcomes, critical risks, indicators, etc; if any), in the Portal's Continuous Reporting tool and in accordance with the timing and conditions it sets out (as agreed with the granting authority).

- **Periodic reporting**: In addition, the beneficiaries must provide reports to request payments
    - for additional prefinancings (if any): an additional prefinancing report
    - for interim payments (if any) and the final payment: a periodic report

EU-Rail may suspend at any moment payments, in whole or in part for one or more beneficiaries, in accordance with the conditions defined in the Art. 30 of the grant agreement. In particular, in such cases, EU-Rail may also initiate a "technical" audit in accordance with art. 25.1.3 of grant agreement applicable to lump sum grants.

If the ineligible contributions or serious breach of obligations are detected, it may lead to lump sum contribution rejection or grant reduction and, if necessary, recovery (as per art. 27 & 28 of the grant agreement).

7.4 Additional criteria to be applied in the Flagship Project Maturity checkpoint

To enable controlled execution of the Programme, the Flagship Projects should follow project phases and use stage gate planning of the maturity checkpoints. This will enable a clear status to be reached before proceeding to the next phase and facilitate consistency across and interaction between the Flagship Areas. The process will be a management activity within the project and part of the governance process of the integrated Programme.

Following the process described in Section 6 of this document, checkpoint maturity review will be used to assess in a qualitative and quantitative manner the progress of the project and the compliance with the predetermined criteria to move to the next phase by considering the following:
- Follow-up of previous project maturity checkpoint recommendations,
- Evaluation criteria related to the quality of the project outputs,
- Compliance with the 'Description of Action' and the objectives and indicators, including TRL,
- Interfaces with other Flagship Projects and the System Pillar,
- Review of the risks, opportunities, and mitigation plans,
- Dissemination & exploitation of project results,
- Any adjustments required to the Multi-Annual Action Plan or future calls,
- The assessors will be provided access to all relevant information prior to the review, including agenda, decisions, and project outputs.

The output of the review will take the form of a colour code assigned according to the following assessment criteria:

Green: Project is under control and objectives have been achieved. Recommendation to continue to the next phase as planned. However, there may be an action plan with minor corrective actions to be completed. This could cover issues and improvements identified at the review that impact on the project, such as process improvement, schedule alignment or content refinement.

Amber: Issues have been identified which pose a threat to a successful outcome of the project and deliverables. Recommendation to continue to the next phase against a corrective action plan, which will be monitored. Typical reasons for an amber status may include but are not restricted to some of the following:

- Project management team not demonstrating adequate control,
- Significant non-synchronisation of dependencies,
- Overconsumption of resources in comparison with the achievements of the project,
- High level of risk identified by the project but with inadequate mitigation plans.

Red: Major deficiencies with the project's management, milestones have not been completed to the required quality in one or several work packages. The concerned work package(s) should not proceed to the next phase until deviations have been rectified. Typical reasons for a red status may include, but are not restricted to, some of the following:

- Project milestones and associated deliverables have not been completed,
- Key deliverables assessed as critically deficient or with major reservations,
- Excessive change in scope,
- The level of risk very high without any mitigation plan.

The JU Programme Manager will send the Review Report to FP Steering Committee no more than 10 days after the review. The FP Steering Committee shall provide its comments in follow-up to the Review Report within 15 days. Subject to the results of the Review, the comments received and any other element, as the case might be, are presented by the Head of the Programme to the ED-SIPB for advice before the Executive Director takes a decision on the Flagship Project or escalates the matter to the Governing Board. Once the course of action is agreed, the Flagship Project is expected to implement the necessary actions within the following 60 days, including initiating the necessary amendments or any other relevant mitigating measure.

EU-Rail may also suspend the grant agreement, in accordance with Art. 31.2 of the GA, in particular when significant deviations are detected.

It may also launch, and also make such maturity checkpoint part thereof, an **Impact Evaluation**, in accordance with Art. 26 of the GA. If ineligible costs or serious breach of obligations are detected within the impact evaluation, it may lead to lump sum contribution rejection or grant reduction and, if necessary, to a recovery (as per Art. 27 & 28 of the grant agreement).

7.5   Use of EU-Rail logo and EU-Rail position

The EU-Rail funded projects must make use of the EU-Rail logo as described in the grant agreement, as well as comply with the provisions of the grant agreement on dissemination and exploitation during and after project termination.

With regard to the use of EU-Rail logo, particular attention should be paid to projects documents, including documents created within an EU-Rail project (by the beneficiaries of EU-Rail grant agreements or external contractors of EU-Rail) for external stakeholders (e.g. standardisation organisations), which they can only represent an EU-Rail position, if the following conditions are all met:

a)   There is an agreement within the project and following the project decisional procedure set in the respective consortium agreement or grant agreement,

b)   There is an agreement with the ED-SIPB,

c)   There is an official agreement granted by EU-Rail, by means of a written confirmation of the EU-Rail ED.

Any project beneficiary should therefore not distribute documents labelled EU-Rail without having taken the above steps or taken the necessary measures to explain that the documents do not represent an EU-Rail position.

Similarly, any project beneficiary or EU-Rail Member can only officially represent an EU-Rail position if:

- the conditions a), b) and c) above are all met in case of a project beneficiary,
- the conditions b) and c) above are all met in case of an EU-Rail Member.

The Project Coordinator or the concerned EU-Rail Member will need to promptly inform either the EU-Rail Programme Manager assigned to the project or the EU-Rail Head of Programme, should such cases arise.

A list of official EU-Rail positions, including possible names of EU-Rail representatives in external working groups, will be made available in Annex D.

8   Risk Management [under revision in 2022]

8.1   Risk Policy

8.1.1 Introduction

EU-Rail is responsible for the execution of the JU's Master Plan leading to the modernisation of the European Rail system and contributes to the completion of the Single European Rail Area (SERA); it is therefore essential to set up a risk management system to enable the Joint Undertaking to fulfil its mission in the most efficient way.

Risk is defined as: "*Any event that could occur and adversely impact the achievement of the EU-Rail's strategic and operational objectives. Lost opportunities are also considered as a risk*".

8.1.2 Policy Objectives

EU-Rail adopts a Risk Management system aiming at optimising the ratio between the level of risk acceptable by the JU and the use of the relevant resources by anticipating and proactively identifying, analysing, treating, controlling and monitoring risks and opportunities. The objectives are:
- Enable informed decision making;
- Determine the acceptable level of risk;
- Prevent the occurrence and mitigate the impact of risks;
- Seize opportunities and enhance their benefits;
- Establish and implement internal control.

8.1.3 Risk Management Principles

The following principles are at the basis of risk management:
- Risk Management is a continuous process which develops at different level of responsibility to ensure the EU-Rail's activities execution and objectives delivery;
- Risk Management is linked to the overall EU-Rail strategy and the risk policy is part of it;
- Risk Management is a process of identifying potential events affecting the ability of EU-Rail to reach its objectives, allowing the management to take actions and to apply mitigating measures, contributing to provision of reasonable assurance on the achievement of the objectives, while maintaining the residual risk at an acceptable level;
- Risk Management covers both threats (potential events that may affect EU-Rail negatively) and opportunities (situations that may have a positive impact on EU-Rail, if adequately exploited).

When an event actually occurs it is managed outside the scope of this policy.

8.1.4 Risk management Governance rules

An effective risk management ensures that risks are managed at the appropriate level of responsibility, therefore it foresees a layered approach based on criticality and scope of the risk to be treated.

The process risk identification starts at any level within the system. Escalating or cascading process ensures that risk is managed at the appropriate level.

The creation of a risk register ensures awareness within the system. The risk management activities coordination falls within the responsibilities of the Internal Control Coordinator.

8.1.5 Alignment with European Commission

EU-Rail follows the principles of the recognised international standards and aligns to the requirements of the European Commission as indicated in the Communication SEC (2005)1327 "Towards an effective and coherent risk management in the Commission services".

The policy and the implementation of the risk management system will be subject to internal auditing.

8.2 EU-Rail JU Risk Management Organisation and Process

8.2.1 Background

The complexity of the EU-Rail activity with the involvement of many stakeholders participating to the execution of the Flagship Projects organised around the Flagship Areas (FA) with many interconnections between the projects, calls for the adoption of a common framework to manage risks and opportunities at the different levels. This introduces common language, process, procedures and methodology, providing a benchmark against which EU-Rail could assess the progress made. This, based on the risk policy, also ensures consistency of information and data related to risks and opportunities enabling a comprehensive risk analysis at the level of the Programme and of the Joint Undertaking.

8.2.2 Framework principles

The main principle for EU-Rail Risk Management is the integration and management within one single framework of:

- The risks relating to the EU-Rail Programme at all levels (Programme Risk Management);
- All risks relating to the EU-Rail JU activities other than the Programme.

The framework is based on organisation principles, processes and tools.

8.2.3 Organisation

The overall coordination of the risk management activities remains within the responsibility of the Head of Corporate Services. He reports to the Executive Director who in turn reports to the JU Governing Board, the body responsible for the overall oversight over the JU's activities.

8.2.4 EU-Rail layered approach

This approach shall be applied to treat both operational risks (those related directly to the Programme) and other non-operational risks (related to the supporting/horizontal processes and to the functioning of the organization as such).

Operational risks:

Layer 1 Joint Undertaking organisation level

At this level, it is about management of risks which may impact the achievement of the JU's strategic objectives. The scope encompasses all the Joint Undertaking activities including governance, funding and resources risks. The Executive Director is responsible to take action on these risks informing the Governing Board and where necessary the EU budgetary authorities.

Layer 2 Programme Activities

This level covers management of risks which, due to of their criticality, may affect the effective execution of the Programme. Considering the interdependency among projects, focus should be put on those risks that may have an impact throughout the Programme. The responsibility of risk management is with the Head of Programme who, with the support of the Programme Managers, will identify and analyse risks and implement mitigating actions. The System and Innovation Programme Board is in charge of identifying risks and opportunities and related mitigating actions. The Head of Programme and the ED-SIPB will report to the Executive Director.

Layer 3 Project level

At this level, the focus is on management of risks related to the performance and to meeting the objectives of individual projects. The Flagship Project Steering Committee is in charge of deciding on risk mitigation measures to be implemented by the project. The FP Project managers monitor and manage risks related to the project they are responsible for, with the support of the FA Project Office. The risk management of projects is also part of the Section 7 of this document.

The following table shows how risk management is distributed in respect of operational risks:

Risk Layer	Risk Manager	Supporting Group	Frequency of review	Report
Layer 1	Executive Director	Management Team	Once a year as part of the WP preparation	Governing Board
Layer 2	Head of Programme	Programme Managers, ED-SIPB	Continuously	Executive Director

Layer 3 (for Flagship Projects)	FP Steering Committee		Continuously	ED-SIPB
	FP Project Managers		Continuously	FP Steering Committee
	WP Project Managers		Continuously	FP Project Managers

Table 2 - *risk management distribution*

Similarly for non-operational risks:

Layer 1 Joint Undertaking organisation level

Same as above for operational risks

Layer 2 Corporate Services level

This level covers management of risks relating to the support functions that may affect the efficient and effective execution of the Programme and may jeopardise the legality and correctness of the activities performed by the Joint Undertaking. The responsibility to manage these risks is with the Head of Corporate Services. However, risks relating to the Human Resources and Communication are directly under the responsibility of the Executive Director.

Layer 3 Sector level

Staff of each sector is in charge of identifying and managing the risks related to the activities falling under their responsibility and which might jeopardise the achievement of the set specific sector objectives. They will escalate the risk at the level above, as appropriate.

This approach implies that risk management, albeit centrally coordinated by a specific function facilitating and fostering compliance with the EU-Rail risk policy and application of the common framework and its processes, is a business-owned and business-driven process implemented in a decentralized manner, involving all JU staff members and other stakeholders.

8.2.5 Internal Audit

Internal Auditor plays an important role in evaluating the effectiveness of the EU-Rail risk management process, and the Internal Auditor should consider risks when planning their work and particular audit engagements. It should be noted, however, that to preserve its organisational independence and objective judgement, Internal Auditor should not take any direct responsibility for making risk management decisions or take up any risk management functions.

8.3   Risk Management Process

The process is built on different steps and is iterative, the picture below gives a clear idea of how it is organised.
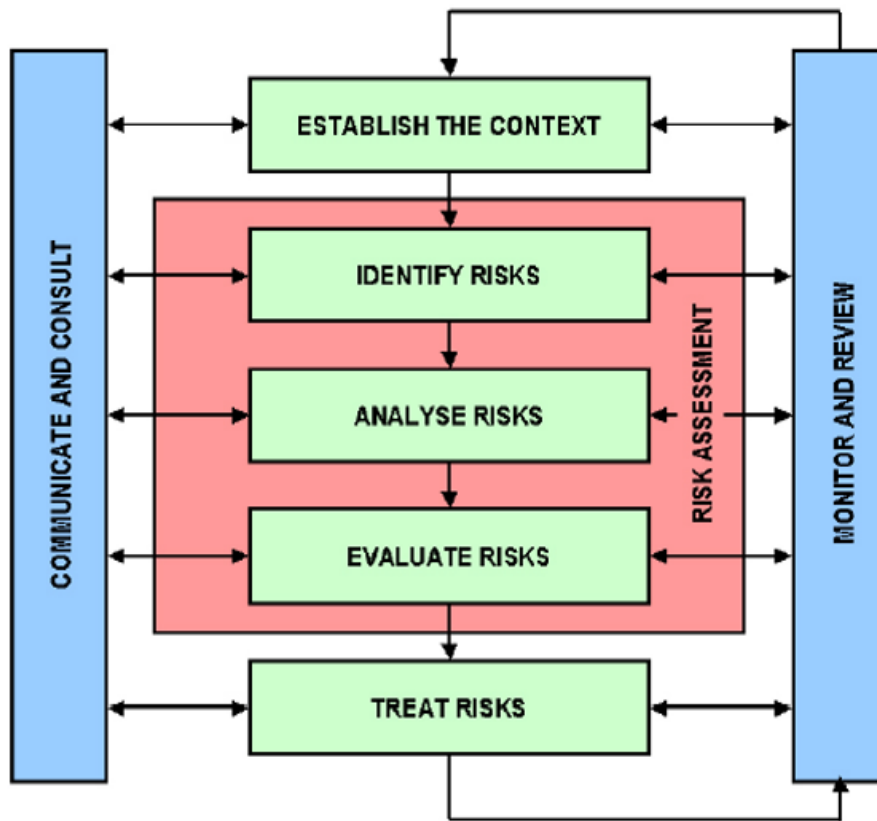
Figure 9 - Risk Management Process

8.3.1 Establish the context

A clear risk policy communicates to the staff and stakeholders how EU-Rail positions itself against risks defining what is the level of uncertainty that the JU is willing to accept (risk appetite) in respect to the achievement of its objectives, and how it will manage it. The Executive Director approves the policy and sets the tone, staff at the different levels implement the policy. The strategic objectives of EU-Rail are set in the Single Basic Act (Council Regulation (EU) 2021/2085) and are the reference point against which the risks and opportunities are assessed. The strategic objectives are then broken down in specific objectives relating to the effective use of resources, safeguarding of assets and information, tackling fraud and irregularities, reliable reporting providing a true and clear view of the activities performed, and compliance with the applicable legal framework.

8.3.2 Identify risks

Events are identified by management and staff considering a variety of internal or external factors which may give rise to risks and opportunities at different levels within EU-Rail.

8.3.3 Analyse and evaluate risks

Managers and staff should assess the extent which a risk or an opportunity have on the achievement of JU's objectives. Risks are assessed from two perspectives, likelihood and impact both from quantitative and qualitative views. Risks are assessed on both an inherent and residual basis.

8.3.4 Treat risks

Having assessed relevant risks, management and staff determine how they will respond. Possible responses include risk avoidance, reduction, sharing and acceptance. Responses should be determined considering the effect they have on the risk likelihood and impact, as well as taking account of the cost-benefit ratio, and eventually, the selected response should be aligned with the desired risk tolerance.

8.3.5 Monitor and review

Adherence to the risk policy and implementation of the response actions should be monitored at the different levels under the responsibility of the risk manager. Regular reviews are carried out in order to identify new risks and verify that those already identified before are adequately followed-up and that their criticality remains within the limit of the set risk tolerance.

8.3.6 Communicate and consult

Periodic reports should be produced at the different levels to reassure senior management on the implementation of risk management process and its effectiveness.

8.4   Methodology[14]

The evaluation of a risk or an opportunity is influenced by the scenario in which EU-Rail operates, this is either the present environment, or the future predicted one. The criticality of a risk is the result of the combination of the severity (impact) of the risk, and the probability that the risk actually occurs. The severity can be assessed as the impact of the risk materialization on the EU-Rail activities and their objectives, considering primarily the following basic types of potential impact:

- Cost;
- Delay;
- Performance;
- Reputation.

Each type of impact can be evaluated using a scale from 1 to 5 (very low, low, medium, high, very high), as detailed in the following tables:

Cost Impact		
#	Impact	Description
1	Very low	Incidental, maybe even avoidable impact resulting from non-optimal use of resources
2	Low	Minor impact resulting from non-optimal use of resources
3	Medium	Significant impact requiring a review of the underlying activity
4	High	Endangers the financial viability of the underlying activity with affects other related activities (interdependencies)
5	Very High	Jeopardises the effective execution of the EU-Rail budget due to uncontrolled and excessive rise of costs

Table 3 - Cost Impact Scale

Delay Impact		
#	Impact	Description
1	Very low	Delay conceivable but Programme planned execution not affected and delay may also be avoided
2	Low	Involves probable delay but does not affect the Programme planned execution
3	Medium	Requires a re-planning of the activity with minor impact on other related activities
4	High	Determines non-compliance with set milestones with significant impact on interdependencies and causing substantial re-planning
5	Very High	Determines an unrecoverable delay affecting the whole execution of the Programme

Table 4 - Delay Impact Scale

Performance Impact		

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[14] Methodology for operational risks: considering the similarity of risks identified at project level – Layer 3 (i.e. similar risks in different projects/grant agreements) - the Programme Managers will use the methodology developed in this chapter and escalate to the Programme Activities – Layer 2 – those risks identified as unique or as recurrent and that may have an impact throughout the Programme.

#	Impact	Description
1	Very low	Non-compliance so negligible that Program may not even be affected, but still conceivable
2	Low	Little non-compliance with the expected results requiring limited adjustments with no significant impact on the Programme
3	Medium	Causes non-compliance which significantly affects the achievement of the set objectives
4	High	Represents an important issue of non-compliance with very negative impact on interdependencies requiring a review of the set objective
5	Very High	Serious non-compliance that jeopardises the achievements of the Programme objectives

Table 5 - Performance Impact Scale

Reputation Impact		
#	Impact	Description
1	Very low	EU-Rail reputation very unlikely to be damaged
2	Low	EU-Rail reputation damaged without affecting trust and involvement of stakeholders
3	Medium	EU-Rail reputation damaged and affecting trust and involvement of stakeholders requiring remedial actions through communications
4	High	EU-Rail reputation damaged in a way that specific and extensive communication and additional unplanned actions are needed to recover trust and involvement of stakeholders
5	Very High	EU-Rail reputation damaged in a way that trust and involvement of stakeholders is certainly lost and cannot be recovered within a reasonable time

Table 6 - Reputation Impact Scale

Similarly, the probability of the risk being materialized should be evaluated using a scale from 1 to 5 (very low, low, medium, high, very high), as follows:

Probability		
#	Impact	Description
1	Very low	Improbable – so unlikely that probability is close to zero
2	Low	One or no occurrence during the execution of the Programme
3	Medium	Few occurrences may happen during the execution of the Programme
4	High	Several occurrences may happen during the execution of the Programme
5	Very High	Many occurrences will almost certainly happen during the execution of the Programme.

Table 7 - Probability Scale

8.4.1 Gross criticality

Gross criticality refers to the inherent risk, that is to the risk as is without considering the existing controls or mitigation measures, and it represents the combination (multiplication) of the probability and severity (impact) of the risk.

It can be calculated using the matrix below:

Likelihood		Column1	Column2	Column3	Column4	Column5
	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
		Severity				

In order to assess the gross criticality, in case there are several potential scenarios of how the risk could materialize, the following applies:

- For the risk likelihood, the most probable scenario of its materialization is considered;
- For the risk severity (impact), the scenario having the most severe impact is considered.

This is a conservative and sound approach which is suitable for the character of the activities performed by EU-Rail.

As shown in the above matrix, the criticality assessment results in four levels:

- Green – Very low / low criticality (from 1 to 6)
- Yellow – Medium criticality (from 8 to 12)
- Orange – High criticality (from 15 to 16)
- Red – Very high criticality (from 20 to 25)

However, in practical implementation, this "mathematical" approach will be combined with professional judgement and overall proportionality considerations, when assigning the final level of criticality to particular risks.

8.4.2 Mitigating actions

Mitigating actions possibly taken by the JU could take the form of:

- Avoiding the risk – e.g. not performing a specific action;
- Transferring the risk – e.g. buying an insurance policy for a premium;
- Reducing the risk – by applying mitigating actions decreasing the risk's impact or likelihood, or both;
- Accepting the risk – e.g. where the overall criticality falls within the limit of the set risk tolerance, or when mitigating measures are not feasible or would be excessively costly.

In general, the effectiveness of the risk-mitigating action/measure, that is the extent to which it reduces the inherent impact or probability of the risk, can be expressed as per the following scale:

Effectiveness of mitigating actions		
#	Impact	Description
1	Very low	Negligible – almost no reduction at all
2	Low	Small reduction of impact/probability
3	Medium	Considerable reduction of impact/probability
4	High	Significant reduction of impact/probability
5	Very High	Risk criticality eliminated or reduced to non-significant, or even zero level

Table 8 - Effectiveness of mitigating actions

8.4.3 Net Criticality

After considering the effect that the mitigating actions/measures have on the inherent risk, we arrive at the residual risk, respectively to the risk's net criticality.

Likelihood		Column1	Column2	Column3	Column4	Column5
	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
Severity						

There are five levels of net criticality:

- Green – Low net criticality (1 to 3)
- Yellow – Medium net criticality (from 4 to 6)
- Orange – High net criticality (from 8 to 12)
- Red – Very High net criticality (from 15 to 16)
- Black – Unacceptable net criticality (from 20 to 25)

Again, this scale of net criticality derived from the matrix presented above, serves for initial orientation, but needs to be combined with professional judgement and practical experience of the stakeholders involved in the JU risk management process.

The net criticality indicates the residual risk that EU-Rail has to manage and can serve also an indication of the necessity and urgency of potential further actions to be introduced in order to secure the execution of the activities in line with the Programme's objectives.

8.5   Reporting cycle

Risk Management is part of the planning process insofar it identifies, analyses and treats risks which may jeopardise the achievement of the objectives set in the plan. Identification and assessment of the key risks EU-Rail will face in the upcoming period is an integral part of the JU's Work Programme preparation, including the identification of the related risk-mitigating actions/controls that are planned or already in place. The actual results of the risk management process are then reported in the Consolidated Annual Activity Report for the respective year. The basic timeline of this process is depicted in the following diagram.

JU Risk Assessment and Reporting Cycle
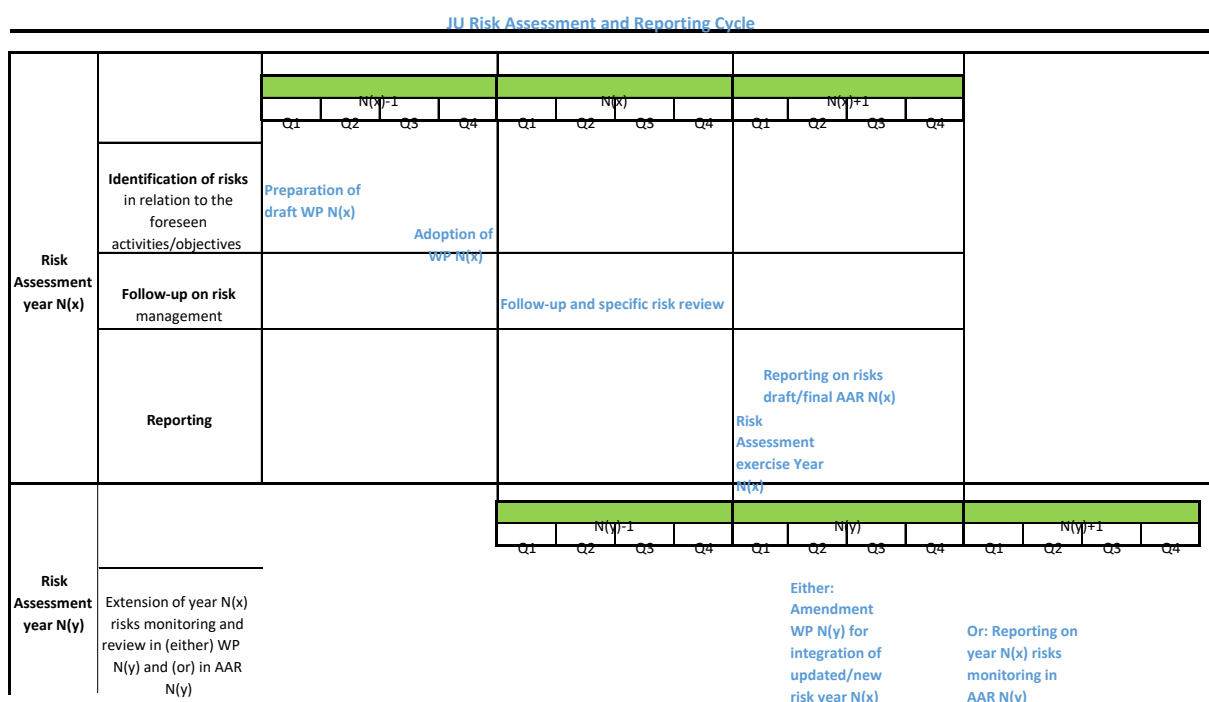
9 Requirement management applicable to Flagship Projects

The requirements applicable to Flagship Projects are requested in the call topic for Flagship Areas and set out in the grant agreement of each Flagship Project. During the project execution, additional requirements should be collected and managed in a collaborative way, in particular when they are owned by entities outside of the consortium (e.g. other Flagship Project, System Pillar, a regulation…).

During the execution of Flagship Projects, requirements should be capitalised. While high level requirements for solutions developed in projects will be openly published, some detailed requirements (e.g. the industrial process) may need confidentiality.

The System Pillar or other FAs may export requirements to a Flagship Project. After the grant agreement is signed, evolution of applicable requirements is handled in the Flagship Project change management process.

Reports on requirements status (allocation, change, validation, completeness, etc.) are monitored by the ED-SIPB and FP Steering Committee.

10 Change Management

The objective of change management is to effectively control changes and unplanned maintenance services throughout the execution phase of the projects or programme. This can be done by means of standards and procedures and by outlining the necessities towards the prioritisation and authorisation, impact assessment, tracking, reporting, closure and documentation of changes.

In the context of the EU-Rail Programme, changes on scope, schedule and budget are considered. For instance, specific changes to projects can be made, as well as more generic changes to the Programme.

Change can be required for various reasons, but is often triggered by service requests, incidents or issues, for example due to a new risk (or opportunity), unavailability of resources, under- or overestimated workload, technical issues etc.

Possible changes shall be discussed at the lowest operational level and escalated at the correct decision-making level, up to the Executive Director, in accordance with the approach defined in the SBA. The relevant FP Steering Committee may act as an advisory body to the Programme Manager regarding the proposed change(s).

The following steps, presented in Figure 11, describe a standard procedure which can be applied. After identifying which elements need to be changed, it is key to analyse the situation with all relevant stakeholders and to define an appropriate approach. After implementation, the results are monitored via the quality management process.

| Identify the change | → | Define approach | → | Implement | → | Monitor |

Figure 11 - Change management process

10.1   The Executive Director System and Innovation Programme Board

The Europe's Rail ED System and Innovation Programme Board (ED-SIPB) has been created in 2022 by the ED Decision (xxx) as an integral part of the decision-making procedure of the Programme governance supervised by the ED. It is at the core for the change management process for the integrated Programme.

The ED-SIPB members include 1 representative of the European Commission, 1 representative of each of the Private Founding Members as defined in the SBA, and 1 representative of the System Pillar Core

Group. In addition, observers may be invited to attend the meetings on the basis of the agenda points. The JU ensures the related secretariat services and chairs the meetings. A review process of the ED-SIPB functioning will be performed after 18 months, indicatively by end 2023, notably with the possible inclusion of the Deployment Group representation.

Meetings are held on a monthly basis, with regular reporting to the GB of the activities performed. The Executive Director may convene *ad hoc* meetings with the Members who would be coordinating Flagship Projects (SIBP Committee) to prepare the meetings of the ED-SIPB or address specific issues to be later on presented and discussed at the ED-SIPB.

The ED-SIPB is responsible for providing advice to the Executive Director on resources, schedule, planning and synchronization, implementation, change management and monitoring the progress of the Programme, as well as for delivering strategic guidance and making recommendations with regard to the management of the JU programme.

The ED-SIPB provides advice and support to the ED, focusing on:

- strategic exchanges on the Innovation and System Pillars, their evolution, and interdependencies;
- providing strategic guidance and making recommendations with regard to the management of the Programme;
- resources, implementation and monitoring of the progress of the Programme (System and Innovation Pillars, Deployment Group);
- identification of risks and opportunities between Flagship Projects and interaction with System Pillar and following up on the risk-mitigating actions as well as on the financial impact;
- advice to the Executive Director on solving issues escalated to his attention (e.g. potential interaction and/or resourcing conflicts between the Innovation and System Pillars) in accordance with the EU-RAIL framework on Programme implementation and propose a way forward;
- advice to the Executive Director on the need to complement the Programme with specific expertise to be contracted, as needed;
- synergies with other partnerships, Union programs, etc. in view of the R&I integration;
- assessment of the System Pillar and Innovation Pillar reporting (every two months);
- assisting and advising the Executive Director in any matter of relevance.

The ED-SIPB will assist the ED in the process by which synchronisation between the System Pillar and the Flagship Areas should be achieved. This is essential to ensure that the Joint Undertaking's activities cover all the necessary stages of the innovation cycle, making the most efficient use of the available resources by coordinating and consolidating initiatives under one umbrella. In addition to that, part of the ED-SIPB role is also to provide assistance in solving different issues that may arise in Programme implementation and to propose the way forward, in accordance with the provisions of the SBA.

10.2 Changes from SP/IP or FP/FP interactions

The System Pillar with the System Pillar Core Group are in charge of the investigation and development of the functional layered railway system architecture for railways ensuring its wide adoption, the Operational Concepts, ensuring objectives are achieved with outputs of the necessary quality, that enable safe, secure, and efficient delivery of the new systems including the way how data are shared as well as the associated modelling tools. Changes to the System Architecture and its implementation in EU-Rail Flagship Projects, together with technical assessment, are proposed to the System and Innovation Programme Board to streamline the change management within the running for decision on the potential integration. The process is structured according to the diagram presented below.

In case disagreement and collaboration issues cannot be solved by means of the standard System Pillar / Innovation Pillar Interaction, as described in Section 3.3, the Executive Director will consult the ED-SIPB at the request of the System Pillar Core Group, of the Innovation Pillar Flagship Projects or any EU-Rail Private Founding Member actively working on a FP flagship project, and/or of the JU Programme Office.

The same will apply should any interactions between the EU-Rail Flagship Projects result into substantial impact(s) at Programme level, or in case of absence of an agreement on the collaboration.

The entire process, including ED-SIPB recommendations, should be documented by the JU Programme Office.

Notwithstanding the governance established in the SBA, the figure below presents the way the change management process will be implemented, before escalating any issue to the level of the System Pillar Steering Group and finally to the Governing Board.

EU-Rail Advisory Bodies:
- SRG
- SC
- Deployment Group

EU-Rail Governing Board

Executive Director

System and Innovation Programme Board

Other way forward

Feedback/Input

5. Decision

6. Integration

1.B Selection of subjects and system impact

1.B Selection of subjects and system impact

4. Project / Work Impacts

2 & 3

System Pillar Core Group
- Rail Functional System Architecture
- Operational Concepts
- Conceptual Data Model
- Migration Plan

1.A Initial Assessment

2. Specification Request

3. Technical Assessment

Innovation Pillar Flagship Project X

7. Feedback on Integration

Collaboration

Collaboration

Other initiatives on architectural elements

Other initiatives on R&I related elements

1. **Selection of subjects and system impact**

The System Pillar Core Group, the Innovation Pillar **Flagship Project Managers in particular [or any other GA party]** are responsible for bringing to the attention of the Programme Office and of the Executive Director any subject to be considered under the change management process. This includes risks, issues and opportunities, change requests between or within the Pillars with material impact on ongoing Flagship Projects works as well as to the System Pillar architecture/concept of operations and migration plans. Commercial and legal aspects, tasks or other contractual arrangements, or other initiatives with broad impact on the Programme may be brought to the attention of the ED-SIPB.

In case the selection of subjects stems from the System and Innovation Pillars interaction, the System Pillar Core Group prepares an initial selection of subject(s) for change management, stemming from the work on the architecture and operational concept, which will require a detailed impact assessment

of the change on ongoing Flagship Projects work plans. This may as well concern the migration plans, in this case the impact will be also assessed against the Deployment Group work (**1.A**).

In case the selection of subjects stems from the Innovation Pillar Flagship Project(s) (**1.A**), the Flagship Project Manager(s) [or any other GA party] propose these subjects to the System Pillar Core Group for initial assessment.

The preferred way of resolving any question that affects both groups would be the standard interaction process, as explained in Section 3.3.

For disagreements and collaboration issues that cannot be resolved by the standard interaction between the System Pillar and the Innovation Pillar, the group that initiated the process (either the SP or the IP) would then present each subject to the ED-SIPB in a coherent way (**1.B**), detailing the reasoning for the change accompanied by the proposed selection with a first business and economic analysis of the impact on the entire value chain (business case) and the potential impacts on the railway system processes and operations.

Similarly, for disagreements and collaboration issues that cannot be resolved by the standard interaction among Flagship Projects, the Flagship Project that initiated the process would then present each subject to the ED-SIPB in a coherent way (**1.B**), detailing the reasoning for the change accompanied by the proposed selection with a first business analysis of the impact on the entire value chain (business case) and the potential impacts on the railway system processes and operations.

Where the proposed change management process would not address the question, the Executive Director will escalate the matter to the System Pillar Steering Group and finally to the Governing Board, taking into consideration the advice of the ED-SIPB.

2. **Functional requirements specification implementation requests**

If the process has started with a petition from the **System Pillar Core Group,** it will need to develop and provide a sufficiently detailed and clear specifications requirements request to the potentially impacted Flagship Project(s), based on the system change approved by the ED-SIPB (step 1).

If the process has started with a petition from an **Innovation Pillar Flagship Project:**

-   **towards the SP,** it will need to develop and provide a sufficiently detailed and clear requirements specification request to the potentially impacted System Pillar activity, based on the system change approved by the ED-SIPB (step 1);
-   **towards other Flagship Project(s),** it will need to develop and provide a sufficiently detailed and clear requirements specification request to the potentially impacted FP activity, based on the system change approved by the ED-SIPB (step 1).

3. Technical assessment

The **Flagship Project or System Pillar Core Group appointed representative** executes a technical assessment of the requested implementation of new functional requirements from either the System Pillar Core Group or the Flagship Project.

In order to provide the assessment, the following steps should be taken:

- Identify project/work implications (including implications on work packages, timeline, deliverables, demonstrators, budget and project participants, and existing market solutions) to be agreed in a swift manner accordingly to the internal project processes and structure.
- Provide information about the need for a system change in the currently used rail processes and operations.
- In case of impact on Flagship Projects, ensure that project participants not represented in the ED-SIPB are aware of and do not oppose the possible future grant agreement amendment request (to which in any case every Flagship Project beneficiary could independently decide to adhere or not).

The assessment needs to be duly provided within a reasonable timeframe in principle not exceeding **two** months from the date of the functional specification requirement receipt. Exceptions are possible only under justified reasons beforehand communicated to the System Pillar Core Group, (if process was initiated by the Innovation Pillar Flagship Projects), or to the Flagship Project(s) [appointed point(s) of contact] (if process was initiated by the System Pillar Core Group or it does concerns inter-Flagship Projects concerns). In both cases the ED-SIPB should be informed about any exceptions.

Nevertheless, short-term misalignment between SP architecture and IP implementation might be accepted, that will require to be addressed in the medium term, in particular with the role of the System Experts in the IP.

4. Project / Work impacts

Technical and Project assessment is consolidated by **the System Pillar Core Group** or **The Flagship Project that started the project** within maximum **one** month. The assessment presents the changes to be agreed by the ED-SIPB, as accompanied by a refined results of the business and system impact analysis made by the System Pillar Core Group or the Flagship Project, depending on who initiated the process. The submission should include a Technical/Project analysis (as a complete package) after consultation with the affected Flagship Project(s) or System Pillar Domain teams. **The System Pillar Core Group or Flagship Project** representative should ensure that projects/work implications include at least impacts on work packages, timeline, deliverables, demonstrators, budget, project participants and existing market solutions.

At this stage of the process the proposed change recommendation is submitted to the ED-SIPB only in case of substantial impact(s) on the above-mentioned elements, in case of no agreement was reached already, or in case an amendment to the Flagship Project Grant Agreement is required. In other cases, for the Flagship Project or the System Pillar Domain teams can proceed with the implementation of the change without submitting it to the ED-SIPB for decision as per point 5 below, but just by providing an information point.

5. **ED-SIPB Recommendation on change implementation**

The **ED-SIPB** reviews the recommendation received from the System Pillar Core Group or IP Flagship Projects and provides advice to the ED on the most appropriate decision considering the different elements brought forward. At this point, the ED-SIPB could be extended to beneficiaries of the Flagship Project(s) that might be impacted by the implementation of the proposed architecture or change of Flagship project direction.
The ED-SIPB, chaired by the Executive Director, shall perform a careful assessment of the matter which should include business aspects, high level impacts, benefits for the sector, interaction with ERA, external expertise, simulations, and everything else that would be needed to make effective choices on the basis of the input received. Within **one month** from the received proposal, the **ED-SIPB** provides advice to the ED who takes a decision:

- to go ahead and formally request the impacted implementing project(s) to integrate the proposal,
- to reject the proposal,
- to launch a new stream of research and innovation activities or to postpone the proposal implementation to a later stage, including to the R&I activities outside the Programme,
- to take any other relevant course of action, due to the different possible constraints (budget, resources, timing, etc.)

The ED-SIPB provides a recommendation if the change needs to be implemented in principle within **two** months from the reception of the full and complete documentation as per point 4 above. The recommendation will detail where and how the change needs to be implemented in the integrated Programme.

An amendment to the Flagship Project Grant Agreement might be required for the Project in order to implement the proposed change. The amendment might affect a specific task, a deliverable (content and timing), and also the corresponding budget allocation.

In case major issues remain unresolved, the change recommendation is escalated by the ED to the EU-RAIL System Pillar and eventually to the Governing Board, as deemed appropriate. The ED will present the case to the EU-RAIL Governing Board, providing information on the positions of relevant stakeholders and points of disagreement.

6. Integration

The "changed" **IP Flagship Project** revises the change accordingly to the ED-SIPB recommendation. It implements necessary changes to its Description of the Action and budget, under the precondition that the project beneficiaries are willing to implement them. Where such change would not be implemented, the matter will be escalated to the Governing Board for the necessary strategic decision, including assessment of the future relevance of the project and its possible termination in accordance with Article 32.3 of the Model Grant Agreement.

If needed, Flagship Project submits a Grant Agreement amendment request to EU-Rail within **one** month after receipt of the recommendation for the ED-SIPB and it should be processed within 45 days from the proper and complete submission of the amendment.

The Flagship Project implements the changes once the Europe's Rail Joint Undertaking has accepted the amendment to the grant agreement. Where the implementation would not be achieved or completed, the grant may be reduced accordingly.

The "changed" **SP Activity** implements necessary changes to its work and the JU adapts its specific contracts and associated budget within **one** month after receipt of the recommendation from the ED-SIPB.

7. Feedback on integration

During and at the conclusion of the integration of recommended changes, the IP Flagship Project and SP Core Group should provide feedback to each other depending on who started the process. The feedback should include information on the progress of integration, eventual issues and how they were addressed, as well as lessons learnt and validation of the foreseen impacts on the Flagship Project(s).

10.3 Changes to projects

During the project implementation (Project Review, Maturity checkpoints for FP or in another period, as necessary), or following the change management process for the SP/IP management, changes to the scope, timing, budget, etc. of the project may become necessary.

Proposed changes shall be brought to the attention of the Programme Manager who, with the assistance of the EU-Rail services, will recommend the necessary level of formalization, including a grant amendment as necessary.

If changes entail a change to the grant agreement, a formal amendment to the agreement is required. Project participants therefore need to define the nature of the change and on that basis assess what

action is required. It should be noted that for lump sums Pilot Grant Agreements specific rules apply with regard to amendments.

Detailed guidance on the action required for different categories of changes is available in the following Horizon Europe information:

- [Amendments - Online Manual - Funding Tenders Opportunities (europa.eu)](europa.eu)

Project Coordinator is asked to follow the formal steps in the Horizon Europe's 'Funding & tender opportunities' website[15] and to use the amendment request template to explain the changes to the GA (cf. Annex A).

10.4 Changes to the Programme

Possible changes which may have an impact at Programme level shall be brought to the attention of the ED-SIPB by the EU-Rail Head of Programme. The FP Project Manager should also immediately warn the JU Programme Office in case of detection at Flagship project level. Where necessary, these changes will be formalized by means of amendments to the WP to be proposed by the ED to the GB.

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[15] [Search Funding & Tenders (europa.eu)](europa.eu)

11 Programme Management Tools

In addition to the IT Tools made available by the EC services for management of the HE projects, EU-Rail will establish and provide a common monitoring and management tool for the implementation of both System and Innovation Pillars. This integrated tool jointly developed with other JUs will provide at least the following enablers:

- Documentation management platform for the storage, exchange and co-development of the project's documentation,
- Integrated programme planning (strategic level, workplan level, maturity check milestones, etc.),
- Programme monitoring and Key Performance Indicators functionalities with automated dashboards,
- Supporting environment for Knowledge management (including reference documents and templates), Dissemination, Communication and Exploitations of results.

The developed tool will increase the efficiency of the JU (automation of tasks and processes with interfaces with the EU Grant Management environment) and harmonise practises across the different Flagship Areas by providing support to the Private Members in the management of the Programme and preparation of the reporting.

A first version of the tool with the implementation of the key functionalities is expected to be available by Q4-2022, accommodating requirements on compliance with data protection and cyber security standards. The tool will be funded from the budget of the JU for operational activities.

12 Communication, Dissemination & Deployment

In order to ensure strong engagement from a wide range of stakeholders, communication must be truly integrated into the overall framework of the EU-Rail Programme and its success is intrinsically conditioned by a good knowledge of the membership, the rail sector and its stakeholders.

A major point of attention in communication activities will be the need to ensure the involvement of stakeholders from the entire rail value chain, including actors from outside the traditional rail sector.

The objectives for the communication activities have been identified jointly with the JU's new Members and are provided in the JU's "Stakeholder relations, dissemination, and communication strategy 2022-2027"[16].

EU-Rail communication activities aim to:

- **Continue to raise awareness about the JU** among key stakeholders across Europe from the rail sector and beyond, given the ambition of a better integration of rail with other transport modes for both passengers and freight managers, and the need to establish bridges with other thematic areas and sectors as identified in the EU Green Deal.
- **Support and promote the recognition of the JU's results at global level** to contribute to the competitiveness of the European railway industry.
- **Promote stakeholder engagement** along and across the value chain in order to facilitate cooperation and knowledge exchange. This objective will require the organisation of fora and conferences on specific topics stemming from the new key priority areas and adaptation of key messages to each stakeholder.
  Both of the two aforementioned objectives will require close work with different stakeholders and their associations.
- **Promote the JU within the EU Institutional arena**. This objective consists of maintaining and further developing political support for EU-Rail from the EU institutions and EU Member States through the promotion of the JU, its objectives and achievements. Target audiences for this objective include the European Parliament and/or the Council (with particular attention to the rotating presidencies) and policymakers in EU Member States, the Committee of the Regions, the European Economic and Social Committee and other EU bodies, such as the European Union Agency for Railways (ERA), the European Environmental Agency (EEA) and other Joint Undertakings. This objective might require the organisation of events inside the European Parliament, participation in visibility events such as exhibitions, Open Days, and the production of publications and presentations of key achievements. It is essential to maintain efficient communication channels with DG MOVE and DG RTD and explore all possible collaboration with other DGs, EU Agencies and bodies (ERA, other JUs) where appropriate to further increase synergies between EU policy areas and rail transport. EU-Rail will also build synergies with other transport focused Joint Undertakings through joint initiatives to further reinforce the collaborative message.
- **Define and Lead a coherent dissemination strategy** regarding projects' activities and achievements, notably via coordinating web, documents and event management of the projects, and their presence on the EU-Rail website as well as providing information to projects on Horizon Europe dissemination tools. This will include assisting the projects to disseminate their results through the JU's newsletter and social media channels and providing guidelines to

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[16] https://rail-research.europa.eu/wp-content/uploads/2022/07/EU-Rail-Stakeholder-Relations-Dissemination-and-Communication-Strategy.pdf

the projects on issuing coherent communication products and activities in line with the JU's corporate branding and messages.

- Pro-actively **publish communication material** with regard to external events and meetings related to EU-Rail. A broad dissemination of factsheets, leaflets, reports and brochures will enhance the visibility of the JU towards other stakeholders, including the general public.
- **Establish and develop a network of press and media contacts** in order to achieve considerable visibility in both specialised and general media. This network could be useful to provide visibility to the publication of press releases and specific articles related to EU-Rail's activities.
- **Manage the EU-Rail website, newsletters and social media platforms** in order to stimulate the public interaction on key issues and improve public awareness on the JU's activities and issue the corporate and visual identity of the new JU. To that effect, a bi-annual meeting will be set-up with the Communication officers of the Members to identify joint communication activities and channels, e.g. to elaborate the presence of the JU at major events such as Innotrans. Thanks to the Members the logo for the new JU was created, building on the existing branding but adding, through the visuals, the new objectives of the JU based on the three pillars identified in the Multi-Annual Work Programme.

Further to the above, EU-Rail will rely on key multipliers:

- JU Members, including JU project coordinators, corporate Communication managers and project participants, who will communicate the success of the JU to various audiences;
- ERRAC members, including policy makers and decision-makers;
- Members of the Scientific Committee (SC);
- Local stakeholders;
- Members of the States Representatives Group (SRG);
- Wider stakeholders reached through EU-Rail Information days and online channels Global stakeholders present at key events, within and outside the Union;
- European railway associations, including those in relation to passengers and staff;
- EU-Rail staff acting as ambassadors.

The implementation of the communication activities will continue to be supported through a framework contract established with a communication agency/ies as well as through inter-institutional framework contracts put in place by the European Commission. EU-Rail works in collaboration with other JU's to secure a joint framework contract for communication services.

Dissemination

The results of the ongoing activities and of projects/tenders are disseminated by EU-Rail via its website (the platform for Railway R&I), press releases, newsletters, presentations at internal (EC, Governing Board, Scientific Committee, States Representatives Group) and external (conferences, Info days, etc.) stakeholder events, and through social media.

EU-Rail participates to the different working groups established by the European Commission on dissemination and exploitation activities, to ensure that R&I results are integrated with the overall work performed in the rest of Horizon Europe and, where appropriate, in the ERA activities. It is important to remind that access to information should be always driven by two principles: the need to be able to track and have access to all past information, while at the same time creating opportunities for further dissemination.

Exploitation

Although S2R Programme has already contributed to shortening of the innovation cycle in rail via an integrated research and innovation programme, EU-Rail is expected to accelerate further the introduction of innovative solutions. In order to deploy novel solutions, the sector needs to move towards new ways of working enabling the transformation of rail as one European integrated system.

Only via a coordinated and integrated deployment of system integrated solutions can rail reap the benefits of the investments made, accelerate its transformation and deliver new services to its clients.

There is a clear and shared sector vision that accelerating the deployment of future technological and operational solutions requires decisions that will shape also the execution of the future EU-Rail projects and a different approach: where the introduction of innovative solutions has a clear impact on rail in its systemic nature, deployment shall be coordinated and consistent to accelerate the return on investment and phase out legacy products. This new way of working shall be based on more flexibility and adaptability to user needs, creating solutions much more focused on prototyping and large-scale demonstrations, and increased collaboration integrating new entrants, leading to a shorter innovation cycle and delivering impactful results.

Basic considerations regarding exploitation and deployment of results of R&I activities as per each Flagship Area and the Transversal Topic are included in EU-Rail's MAWP.

In terms of the market uptake of the future rail R&I solutions and their deployment, the SBA foresees an important role of the Deployment Group as an advisory body to the Governing Board.

12.1 The Deployment Group

The structure of the new JU, built upon its two pillars is expected to accelerate further the introduction of innovative solutions. In order to complete the innovation cycle, the deployment of novel solutions requires to move towards new ways of working within the sector, which would encourage the transformation of rail as one European integrated system.

The work performed in the System Pillar ensures the convergence of the sector on the future concept of operations and underpinning system architecture that will transform the performance of the European rail system and contribute to eliminating physical and digital barriers; the Innovation Pillar will deliver the operational and technological solutions which provide the necessary capabilities to

transform the European rail system. Only via a coordinated and integrated deployment of system integrated solutions can rail reap the benefits of the investments made, accelerate its transformation and deliver new services to its clients. Notwithstanding these uncontested targets, the relevant adaptations in the legal framework must not be forgotten; be it at the level of EU and / or national legislation, or at the level of standards. They must be developed in a well-coordinated manner to support a swift deployment of the solutions, where the transition phase is of utmost importance.

The Deployment Group should consist of European rail representatives, in particular of Infrastructure Managers and Rail Operators, but also of suppliers to ensure the preparedness of products, to advise the JU on the way coordinated and integrated deployment can be organised, in particular on the following elements to be proposed by the JU Executive Director, and in consultation with rail stakeholders (such as users associations, logistics associations, environment NGOs etc.), including a representative of the States Representatives Group:

- Examine and provide recommendations on alternative scenarios for the rollout of innovative solutions.

- A roadmap for the coordinated and integrated deployment of the relevant rail research and innovation results, (incl. investment plan if needed).

- Consideration of human factors as a result of deployment.

- Assessment of the relevant legal framework, its necessary adaptations, and the options for the transition phase.

- Ensure consideration of diversity of situations across the Union.

- Alignment of deployment and investment plans.

- Risks and opportunities associated to uncoordinated initiatives.

- Phasing out of existing legacy systems and consideration on the necessary accompanying funding and financial measures.

- Use of a performance scheme that would contribute to accelerating deployment and/or any other relevant measures.

- Any other relevant matter that would contribute to reducing the innovation lifecycle and increase the performance of rail, maintaining the same or even increased level of safety.

The composition of the Deployment Group may be variable, considering the scope of the activities. The governance of the Deployment Group will be established based on the provisions on the System Pillar as stipulated in Article 97(2) of the Single Basic Act. The new structure of the JU should allow covering all phases of the rail research and innovation lifecycle, potentially up to TRL9, in order to allow phasing in deployment as from 2025.

13 Programme closure [to be revised on the basis of S2R experience]

The following chapter highlights the most important deadlines in order to close the Programme successfully. However, after the Programme closure, a number of obligations may still remain.

13.1 Programme completion

Three dates are linked to the notion of Programme completion:

- Final date of eligibility of 'calls for proposals': this date is stated in the Programme Regulation as no later than 31 December 2027 under the Horizon Europe Research and Innovation Programme (In justified cases, calls for proposals may be launched until 31 December 2028 at the latest).
- Physical Programme completion date: this is when all outputs and deliverables in the project have been completed and all costs have been paid.
- Official Programme completion date: this is the date referred to in Article 1 of the Regulations by which EU-Rail has been established until 31 December 2031.

The Programme is completed when the final programme report (FPR) is approved and all outstanding financial obligations are settled. This final programme report will provide an overall assessment of the Programme's results and deliver a final balance. The FPR may not be drafted as long as bilateral activities, closing actions, outstanding issues, etc. are still being implemented.

13.2 Non-completed projects

At the time of the submission of the closing documents, Private Members have to ensure that all projects included in the Programme closure are functioning – meaning that they are completed and in use.

The private Members may decide, exceptionally and on a case-by-case basis, provided that adequate justification exists, to include expenditure paid for a non-functioning project. In doing so the reasons why a project is non-functioning should be taken into account and it should be verified that the financial impact of the project justifies this special treatment.

By including a non-functioning project in the closing documents, the Member agrees to complete the project after the initial deadline, within a timeframe which is to be decided by the GB. The Project Coordinator should ensure that funds are made available to complete the project in a timely manner. If after this new deadline the project is still reported as incomplete, the Project Coordinator will reimburse the funds granted.

In the final programme report a list of all non-functioning projects will be included in order to be able to closely monitor them.

13.3 Final Closure

In order to fully close the Programme and submit the final programme report some administrative and operational tasks, i.e. financial obligations, reporting, communication, etc. need to be finalised first.

13.3.1 Financial obligations

A calculation of the final balance will be included in the FPR which implies that all administrative tasks must be completed beforehand. This means that all final payment claims must be filed, payments settled, funds reimbursed and management costs must be completed.

The Central Audit Service shall submit a final audit report and closure declaration to assess the validity of payments in the final balance.

13.3.2 Documenting and reporting

The ED must ensure that the completed Programme information is submitted. This information includes the summary of all project results (functioning and non-functioning), bilateral results as well as all financial information. The ED will ensure that:

- Information about the programme, the objectives, the implementation, results and the overall impact of the Programme is made know to the citizens, beneficiaries and relevant stakeholders;
- Information on the results and the impact from the Programme must be presented on the Programme's website;
- The information and publicity measures are implemented in accordance with the Communication Plan;
- Project Coordinators have fulfilled their information and publicity obligations.

13.3.3 Final Programme Report

EU-Rail has the overall responsibility for reaching the goals and objectives as stated in Article 2 of the Regulations. The final report will provide an overview of the financial statements and implementation arrangements. In particular the final report should include the following information:

- the number and type of funds granted during the Programme;
- an overall assessment of fund performance in terms of its contribution to the achievements of the objectives of the Programme;
- a summary description of the Programme, the different projects results, deliverables and objectives reached;
- follow-up on irregularities;
- best practices;

- list of non-functioning projects;
- closure declaration from Central Audit Service;
- the overall Programme's result and acceptance.

Annex A: Templates

- Templates for the Private Members' annual IKAA declaration
  xxx

- Meeting Minutes

  AnnexA_Meeting-M
  inutes.docx

- Deliverable templates:

  AnnexA_Deliverable
  _Template.docx

- template for Technical Periodic Report (Lump Sum)

  AnnexA_template-f
  or-Technical-Periodi

- template for Amendment explanation

  AnnexA_Explanatio
  n_Amendment_Temp

Annex B: Contact persons of EU-Rail

To contact us: *https://rail-research.europa.eu/about-europes-rail/contact/*

Annex C: ED Decision 2016/017, Guidance for members and their appointed auditors_20161118 final

https://shift2rail.org/wp-content/uploads/2017/11/Annex-F-ED-Decision-2016017-Guidance-for-members-and-their-appointed-auditors_20161118-final.pdf

Annex D: list of official EU-Rail technical positions and names of official EU-Rail representatives in external working group

Annex E: List of projects with level of ERA desired involvement

Annex F: Recommendations for Flagship Projects
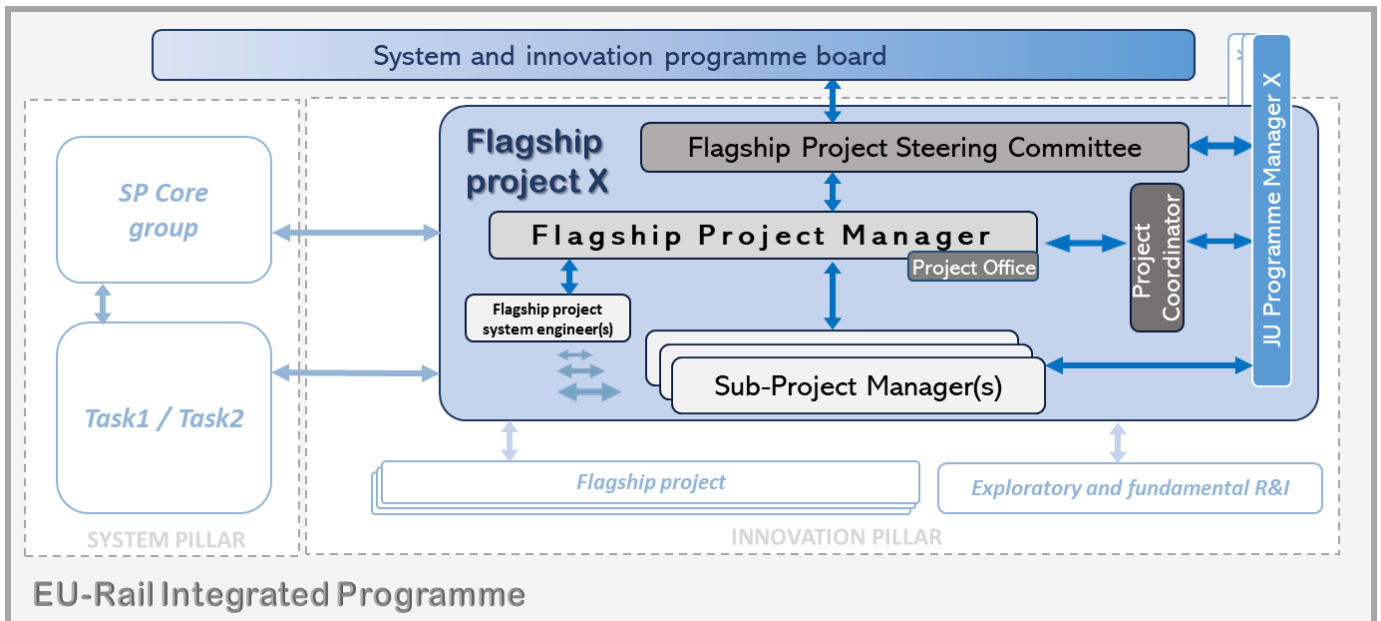
Figure xxx: Recommended Flagship Project structure

The following table provide a recommendation for the roles and responsibilities for a Flagship Project. This includes the governance within a Flagship Project and interfaces between the actors within a project and between projects.

Function/Body	Overview of tasks
System and Innovation Programme Board	• Providing strategic guidance and making recommendations with regard to the management of the Programme • Resources, implementation and monitoring the progress of the Programme
Flagship Project Steering Committee	• Overall steering of the project • Review and challenge project progress and achievements
Flagship Project Manager	• Responsible for the delivery of all sub-projects to meet the objectives of the Flagship Project • Responsibility of all sub-projects and change management activities required for the successful Flagship Project deliverables
Project Coordinator	• Responsible for the project and grant implementation and for the representation of the project in relation to the funding authority • Act as the intermediary for all communications between the consortium and the granting authority

	• Monitors that the actions are implemented in accordance with the GA and covers administrative topics performed by the Project Office to ensure the funding • Recommended to be from the same company as the Flagship Project Manager
Flagship Area Project Office	• Supports Project Coordinator, Flagship Project and Sub-Project management in all project-related business activities (reports, KPIs, planning.) • Scope and financing must be agreed in each Flagship Project
Flagship Project System Experts	• Feasibility checks of developed concepts/proof of concepts over all projects • Check of all developed concepts/interfaces/deliverables (technical synchronization)
Sub-Project Manager	• Responsible for the delivery of all work packages to meet the objectives of the Sub-Project • Can be also the work package leader • Interface to Project Coordination and System Experts
Joint Undertaking (Senior) Programme Manager	Roles defined in chapter 4.1.1 of the Governance and Process Handbook
Beneficiaries	• Responsible for deliverables according to the agreed scope in the Grant Agreement

Table xxx: Overview of Flagship Project roles

The Flagship Project (FP) Steering Committee is the decision-making body of a Flagship Project. Where needed, it escalates any risks, issues and opportunities having a Programme impact to the System and Innovation Programme Board.

The FP Steering Committee consists of the FP beneficiaries; a JU representative is invited as observer. The main responsibility of this committee is the overall direction of a given FP, including deciding on requests for change concerning content, planning or cost. They are in charge of reviewing and challenging the overall progress of the project, especially its achievements, and of monitoring all project risks and mitigating measures. Part of their duties is to endorse the project results and, if necessary, to manage the project reprioritisation and critical success as directed by the SIPB.

This committee serves as the final decision authority in the escalation process of the Flagship Project before escalation an issue to the SIPB. Regarding their relation to the Project Manager, they provide guidance and can delegate certain tasks.

The Project Coordinator fulfils the following role and tasks, as also provided in the grant agreement Art. 7:

- monitor that the action is implemented properly,

- act as the intermediary for all communications between the consortium and the granting authority, unless the agreement or granting authority specifies otherwise, and in particular:

    o submit the prefinancing guarantees to the granting authority (if any),

    o request and review any documents or information required and verify their quality and completeness before passing them on to the granting authority,

    o submit the deliverables and report to the granting authority,

    o inform the granting authority about the payments made to the other beneficiaries (report on the distribution of payments; if required),

- distribute the payments received from the granting authority to the other beneficiaries without unjustified delay.

This entails various tasks, such as monitoring the project schedule, creating templates, performing project reporting, financial reporting, organizing external meetings, performing risk management tasks, support project and work package participants in all issues regarding planning, reporting and administrative project management, including amendments.

He/She provides, and ensures usage of, agreed project templates and tools to all work packages of the FA in line with the EU-Rail Governance and Process Handbook.

The **Project Office** supports the Project Coordinator and the Flagship Project Manager in their various tasks such as monitoring the project schedule, creating templates, preparing project reporting including financial reporting, organizing external meetings, risk management tasks, support project and work package participants in all issues regarding planning, reporting and administrative project management, including amendments.

The **FP System Experts** have the technical skills necessary for the fields in which they operate and are in charge of providing support to the maintenance of the consistency between technical concepts and architecture within the FA and across the Programme, notably interfacing with other FP System Experts.

They manage the assessment of system and architecture impact for all change requests and requirements regarding content of all work streams / work packages while ensuring system consistency of deliverables and provide content expertise to the FP PM and project partners. They provide the overall technical expertise to the project and ensure system consistency of deliverables

and work package documentation. In addition, they drive the best design and engineering practice sharing between the work packages.

They safeguard the compatibility of different functional blocks between the work packages.
They take part in the collaboration with the System Pillar, they can be the FP single contact point for the System Pillar Core group. They share best practices, methods and tools among Flagship Projects and with the SP and ensure alignment.

Each consortium body can choose their Flagship Project System Expert(s).

The **Sub-Project Manager/Work Package Managers** main responsibility is to implement in concrete actions the defined targets according to the MAWP and the GA. They have the overall responsibility of the work-stream/WP and are in charge of their coordination as well as the work package organization and the management of stakeholders.

A detailed role description for each role, you will find in annex G.

Recommendation for Flagship Projects' planning:

In order to facilitate common understanding between projects but also to optimise execution, minimum planning guidelines must be fulfilled:

- Flagship Project activities should target a given maturity (TRL) for a solution/R&I challenge,
- Before delivering a solution to a given maturity, checkpoints should be organised with external entities having an interest in the project (e.g. other Flagship Project, SP, ERA…)
- Checkpoints should allow for alignment, typically on requirements, architecture, achievable performance and for ending project activities.

The following graphic presents a simplified approach for the iterative refinement of the TRL/milestone planning along the EU-Rail Programme execution.
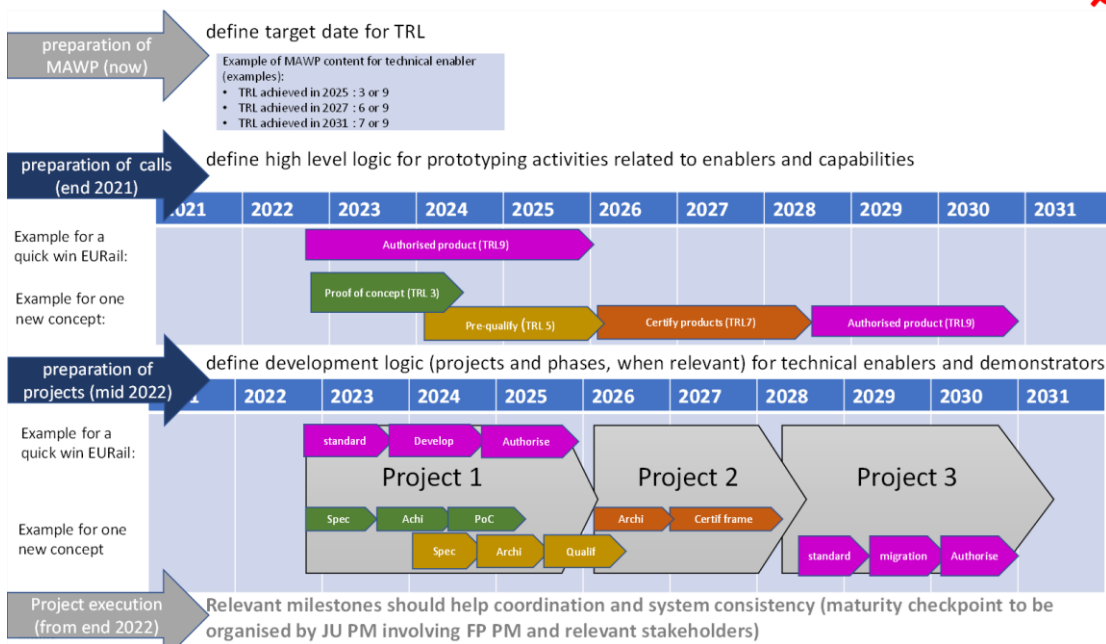
Figure 12 - Overview of the project planning

In addition, detailed planning should be adapted by each granted project for its specific need.

Minimum planning requirements for Flagship Projects

When an innovative solution starts from the concept stage, the Flagship Project activities should be structured into 4 phases aligning with the Technology Readiness Levels as follows:

- TRL 1-3 Basic Research
- TRL 3-5 Development
- TRL 6-7 Demonstration
- TRL 8-9 Early Deployment

Note: a R&I challenge may not need to follow all these phases, one after the other (e.g. when an activity build on Shift2Rail results, Flagship Project may look at early deployment already in 2025) and agile approaches should be implemented wherever possible.

Each phase should contain 3 generic intermediate milestones that can be scaled to the technology level readiness as shown below:

- System Requirements Specifications, linked to customer, regulatory requirements, standards;
- Solution, linked to System Architecture / System Interfaces Description;
- Prototype / Demonstrator, linked to performance prequalification tests and authorisation.

Technology Readiness Level	Specification	Solution	Prototype /Demonstration
TRL 1-3 Basic research	Preliminary requirements	Preliminary architecture	Proof of concept
TRL 3-5 Development	Detailed requirements	Detailed architecture	Qualified performance
TRL 6-7 Demonstration	Final requirements	Final architecture	Certification framework
TRL 8-9 Early Deployment	Standard requirement	Migration into existing systems	18FMisation

Table 9 - Generic milestones to guide and support the JU Programme

Maturity checkpoints (see chapter 7.4) will be organised by the JU Programme Manager, involving the FP PM and relevant stakeholders. The checkpoint process (i.e. what gate, what scope, when, who evaluate) will be defined and agreed during the grant preparation phase, then refined and steered by both the FP Steering Committee and the System and Innovation Programme Board. The latter will be responsible for evaluating the results of such check points and provide recommendations. The Steering Committee will ensure the implementation of the relevant remedial measures in the respective FP, with the support of the System and Innovation Programme Board and under supervision of the Governing board.

The JU Programme Manager should invite any relevant stakeholder participating to the checkpoint assessment at least 20 working days before the checkpoint, release all material 10 days before the review.

Guidance on how to use key milestones as Flagship project checkpoints to anticipate maturity and measure quality

The following Section presents the generic planning principles that can be implemented in a flexible way as long as the interaction within the projects is efficient and quality can be controlled along execution.

General principles:
- Whatever the maturity level targeted for a solution in a Flagship Project, some key milestones are needed. Key intermediate milestones between start and end of projects are about specification/requirements, design/architecture, qualification/performance
- When a development follows a stepwise approach, from low to high TRL, a given milestone (e.g. specification or result from testing) may be scheduled several time along flagship project(s) execution (e.g. result from prototypes at TRL3, 6 and 8).

Checks to be done at specification stage:

- **For a low TRL solution, requirements can be preliminary, for TRL8/9 solutions, the requirements should be standardized.**
- Within the project, there must be clarity on applicable requirements, external interfaces and detailed development planning. KPIs should be selected.
- Entities having an interest in the project must have common understanding on involved interfaces and synchronization needs.
- At specification stage, as far as possible, regulatory and unresolved standardisation-related issues must be identified and mitigated.

Checks to be done at design/architecture (solution) stage:

- **For a low TRL solution up to TRL3, architecture can be preliminary, for TRL 4 to 7, architecture should be detailed and justified. For TRL8/9 solutions, the architecture should be the new standard for industrial purpose (i.e. migration into existing systems).**
- Within the project, design is justified and there is clarity about technological needs. Architecture can be frozen and is traced towards applicable requirements. Detailed targets are defined for KPIs.
- Entities having an interest in the project must have common understanding on interfaces that will be demonstrated and on verification and validation approach.
- At the design stage, as far as possible, the applicable regulatory and standardisation frame is known.

Checks to be done at qualification (prototype/demonstration) stage:

- **For a low TRL solution up to TRL3, proof of concept can be limited in scope and representativeness. For TRL 4 to 7, solution need to be qualified: the higher will be the TRL, the more complete should be qualification (e.g. moving from lab test to full scale experimentations). For TRL8/9 solutions, all performances targets, record and templates to get a (when relevant safety related) certificate should be clear.**
- Within the project, performances for a given technical solution is defined (KPIs are measured). A dissemination plan is defined for the results of the project.
- Entities having an interest in the project must have common understanding on interfaces standardisation needs (e.g. what flexibility) that will be demonstrated and on verification and validation approach.
- At qualification stage, as far as possible, solutions are ready to be deployed.

Checks to be done before ending project activity:

- **For a low TRL solution up to TRL3, ensure that concept is defined and supported by investors. For TRL 4 to 7, solution meet expectation in term of performance and**

migration. For TRL8/9 solutions, the solution is ready for use, there is, when relevant, a community and process identified to manage continuous improvement loop.

- Within the project, all applicable information is finalized, including identification of further R&I required. A sustainable organization for further feedback and exchange of experience is identified as part of reference information, when relevant.
- Entities having an interest in the project must have access to relevant knowledge gained (new documents, good practice…).

The following table provides an overview of the main targets for different involved entities for organizing checkpoints.

		Specification	Solution	Prototype/Demo	Project phase closure
General maturity target		Requirements captured	Design justified	Performance are identified	The solution is ready for use
Within FA subproject		Detailed planning	Architecture frozen	Artefact (e.g. technical assembly) tested	Communication & Feedback loop
Outside subproject	In the FA	Contribution to KPI allocated	Detailed KPIs targets	KPI measured	Deployment scenario
	Within the innovation programme (across FA's)	Synchronisation are planned	Requirements traced	Interface are defined	Standard interface
	With SP	Interfaces identified	CDM agreed	Standardisation needs defined	Standardisation roadmap
	With ERA	Regulatry Open issues traced	Regulatory needs	Certification frame known	TSI revision plan
	With SC	Consistent with State of the art (academic, industry, on EU and globla level)			
	With Deployment group	Consistent with migration needs			

4 generic milestones

JU Programme manager organise checkpoints in order for the SteCo to validate maturity of deliverables

Table 10 - Main targets for different involved entities for organizing checkpoints

The Key Milestones of the FP should be proposed (scope and date) by the FP Project Manager, assessed by the JU (Senior) Programme Manager and validated by the Flagship Steering Committee.

Annex G: recommendations provided by the JU private Founding Members concerning the Project Management Roles

Where any of the recommendations agreed here below by the Private Founding Members would contradict with any of the Governing Board Decisions, EU-Rail Financial Rules, SBA or Grant Agreement, the latter will prevail and the recommendation disregarded.

14.1 Roles and Responsibilities

14.1.1 System and Innovation Programme Board

Role	System and Innovation Programme Board	Reports to	Executive Director
Roles and Responsibilities The Programme Board shall be responsible for providing advice to the Executive Director, focusing on: • strategic exchanges on the Innovation and System Pillars, their evolution and interdependencies, • providing strategic guidance and making recommendations, with regard to the management of the Programme, • resources, implementation and monitoring of the progress of the Programme (System and Innovation Pillars, Deployment Group), • identifying risks and opportunities and related mitigation actions, • advising the Executive Director in solving issues escalated to his/her attention (e.g. potential interaction and/or resourcing conflicts between the Innovation and System Pillars) in accordance with the EU-RAIL framework on Programme implementation and proposing a way forward,	**Members**	Chair: Executive Director Members: CFM
	Mandate	Flagship Areas and company representation
	Required skills	Management, Programme management and technical understanding

- advising the Executive Director on the potential need to complement the Programme with specific expertise to be contracted, - synergies with other partnerships, Union programmes, etc. in view of R&I integration, - assessment of the System Pillar and Innovation Pillar reporting (every two months), - assisting and advising the Executive Director in any matter of relevance, - new teams / domains in the SP Tasks shall be presented to the SIPB, - change requests impacting the interface between SP and IP has to be prepared by SIPB.	**Interfaces**	Executive Director Flagship Project Steering Committee Governing Board

14.1.2 Flagship Project Steering Committee

Role	Flagship Project Steering Committee	Reports to	System and Innovation Programme Board
Roles and Responsibilities • Overall steering of the project • Review and challenge overall project progress and achievements • Endorse results of the project • Manage project re-prioritisation and critical issues identified by the System and Innovation Programme Board • Deciding on risk-mitigation measures to be implemented by the project • Serves as final decision authority in the escalation process of the Flagship Project before escalating the issue to the System and Innovation Programme Board • Delegate and provide guidance to the Project Manager regarding the evaluation of the project management performance • Timely decisions to the requests submitted by the project management (e.g., manpower, investments) • Approve change requests for the Flagship Area Project (content, planning, cost) • The Steering Committee can decide to involve affiliated companies which are not represented in its standard composition •	**Members**	Flagship Project participants + observer JU representative (PM)
		Mandate	Company representative
		Required skills	Management, project management and technical understanding
		Interfaces	System and Innovation Programme Board, Flagship Project Manager, JU Programme Manager

14.1.3 Project Coordinator

Role	Project Coordinator	Reports to	JU/Flagship Project Manager and Flagship Project Steering Committee
Roles and Responsibilities • Lead all administrative topics to ensure the funding according to the Grant Agreement • Monitor that the action is implemented in accordance with the Grant Agreement • Coordinate, submit and manage amendments • Submit the prefinancing guarantees to the granting authority • Coordinate the collection of financial data and produce annual financial report together with the Project Management Office • Distribute the payments received from the granting authority to the other beneficiaries • Inform the granting authority about the payments made to the other beneficiaries • Coordinate the process for submission and approval of the deliverables and report to the granting authority • Monitor project schedule and report progress in deliverables from the GA in combination with the project monitoring and management done by the Flagship Project Manager • Coordinate the provision of annual technical report and coordinate their review • Coordinate project KPI's for delivery • Coordinate the preparation of a quality plan • Request and organize the review of any documents or information required and verify their quality and completeness before passing them on to the granting authority • Coordinate and perform risk management tasks for project delivery • Coordinate web site, newsletters, technical publications, presentations • Coordinate necessary requests for contract amendments with the funding authority		**Appointed by**	Consortium
		Mandate	Acc. to definition in the Grant Agreement
		Required skills	Management, project management and rough technical understanding
		Interfaces	Flagship Project Steering Committee: Flagship Project Manager (Recommend that the project coordinator comes from the same company as the FPM), all members of the Grant Agreement

14.1.4 Flagship Project Manager

Role	Flagship Project Manager	Reports to	JU, Flagship Area Steering Committee and System and Innovation Programme Board (monthly summary, quarterly report)
Roles and Responsibilities The Project Manager is the central manager of the project and acts in coordination with the Project Coordinator. He/she is responsible for the project and to achieve the defined project targets according to the grant agreement. Every Flagship Project Manager needs a deputy. The responsibilities will be defined by the Executive Director or his delegated representatives, on the basis of the agreement with each Flagship Project Steering Committee. The FP Project Manager shall not undertake any of the tasks of the Project Coordinator. Detailed responsibilities and rights: • Overall responsibility and management of project organization, sub-project organization, consortium, stakeholder management • Monitor and manage the projects achievements (including project planning, resources, budget, risks, and progress reporting incl. KPI-monitoring, dissemination, and FA marketing activities) in line with the GA and in cooperation with the JU Program Management • Develop the overall project plan (phases, milestones, inputs, outputs, deliverables), chair relevant management meetings • Coordination of all sub-projects, workstreams and change management activities required for the successful project delivery • Contact point for technical and project management issues • Conduct of risk assessments (including implementation of measures for risk mitigation) • Budgeting / Cost / Funding Controlling • Provision of KPI information • Responsible for the management of the project reports, with any corrective action • Coordination of all change requests		**Appointed by**	EU-Rail
		Mandate	Overall responsibility for the project
		Required skills	
		Interfaces	Flagship Project Steering Committee Flagship Project System Expert Sub-Project Managers, JU Programme Manager

• Internal Project Communication within project organization, sub-project managers /–teams • Represent externally the Flagship Project together with the Project Coordinator • Interface to other Flagship Areas • Escalation level for sub-project managers / members • Supports coordination of interfaces to other Flagship Areas Projects and Norm & Regulation authorities • Falls under the guidance of the System and Innovation Project Board		

14.1.5 Flagship Area Project Office

Role	Flagship Area Project Office	Reports to	Flagship Project, Project Manager, Project Coordinator
Roles and Responsibilities - Supporting function for the Flagship Project Manager / Sub-Project Manager (including for example project scheduling, templates, project reporting, financial reporting, KPIs, project/external meetings, risk management, change management, project controlling, document management systems, deliverables workflow, funding topics ….) - Provide and ensure usage of agreed project templates/tools to all sub-projects of the FA (reporting, risk analysis, scheduling, KPIs, change requests, …) in line with the EU Rail Governance and Process Handbook - Supports dissemination activities, marketing concepts and communication (conferences, website and material) - Supports project and sub-project participants in all questions regarding planning, reporting and administrative project management. - Administrative management of amendments		**Appointed by**	Flagship Project Steering Committee or otherwise
		Mandate	Central support function for Flagship Project management
		Required skills	Administrative knowledge, project management skills, well-structured
		Interfaces	Flagship Project Manager, Sub-Project Manager, JU Programme Manager, Members

14.1.6 Flagship Project System Experts

Role	Flagship Project System Experts	Reports to	Flagship Project Manager
Roles and Responsibilities - Support consistency between technical concepts and architecture within the FA and across the Programme, notably interfacing with other Flagship Project System Experts - Provide content expertise to Project Managers / Members - Manage the assessment of system and architecture impact for all changes regarding content of all sub-projects - Safeguards the compatibility of different functional blocks between the sub-projects - Ensures system consistency of deliverables and sub-project documentation - Drive sharing of best design and engineering practice between sub-project teams - Check system aspects of concepts/requirements/change requests - Act as the Flagship Project interface with the System Pillar Core Group - Organise collaboration with System Pillar Tasks - Share best practices, methods and tools among Flagship Projects and with the SP		**Appointed by**	Flagship Project Steering Committee
		Required skills	Technical skills for the necessary fields
		Interfaces	Flagship Project Manager System Pillar Core Group System Pillar Task Leaders

14.1.7 Sub-Project Manager

Role	Sub-Project Manager	Reports to	Flagship Project Manager
Roles and Responsibilities The Sub-Project Manager is primarily responsible for the sub-project and achieving of its targets defined in the MAWP and the GA. Detailed responsibilities and rights: • Overall responsibility and coordination of sub-project organization, work package organization, stakeholder management • Monitor and manage the sub-projects achievements (including sub-project planning, resources, budget, risks, and progress reporting including KPI-monitoring) in line with the GA and in cooperation with the JU Program Management • Manage resources, funding budget • Coordination of all work packages and change management activities required for the successful sub-project delivery • Conduct of risk assessments (including implementation of measures for risk mitigation) • Budgeting / Cost / Funding Controlling • Managing Administrative issues • Provision of KPI information • Responsible of the sub-project reports • Coordination of change requests • Internal sub-project Communication • Interface to other sub-projects, when relevant to other Flagship Areas under supervision of Flagship Project Manager • Escalation level for work package leader/ Members		**Appointed by**	Flagship Project Steering Committee
		Mandate	Overall responsibility for the sub-project
		Required skills	
		Interfaces	Flagship Project Management, Work Package Leader, Flagship Project System Experts, Project Office

14.1.8 JU Program Manager

Role	Joint Undertaking (Senior) Programme Manager	Reports to	Head of Programme Europe´s Rail Joint Undertaking
Roles and Responsibilities ▪ See chapter 4.1.1 of the Governance and Process handbook		**Appointed by**	Head of Programme / Executive Director
		Mandate	
		Required skills	Project management, administrative and technical understanding
		Interfaces	Flagship Project Steering Committee Flagship Project Manager Project Coordinator Sub-Project Managers Flagship Project System Experts Project Office Support external interfaces especially rail stakeholders, EU, other JU's Input to standards and regulations

14.1.9 Beneficiaries (of the Grant Agreement)

Role	Beneficiary	Reports to	Company management
Roles and Responsibilities ▪ Contribute in line with the provisions of the agreement ▪ Reflect feasibility of concepts / sub-projects together with system experts / sub-project managers ▪ Responsible for implementation of concepts / sub-projects in their companies ▪ Provides business expertise to sub-projects / system experts ▪ Act as an active participant in the sub-project organization ▪ Support organizational change management ▪ Identify risks effecting the project delivery ▪ Ensure regular interaction with the Flagship Area System Experts		**Mandate**	Responsibility for their defined tasks according to the grant agreement
		Required skills	Provide good standing experts who have proven to know their topics in depth, including the necessary interfaces to integrate in the railway system
		Interfaces	Flagship Project Steering Committee (as part of), Work Package Leader

Annex H: System Pillar groups roles and responsibilities

[note: to be updated in light of the implementation of the Request for Services of Lot 1 and Lot 2 of the System Pillar framework contract and the development of the System Engineering Management Plan]

15.1   The System Pillar Steering Group

Article 96 of the Single Basic Act sets out the following in relation to the System Pillar Steering Group:

- The System Pillar steering group shall be an advisory body of the Europe's Rail Joint Undertaking in charge of providing advice on System Pillar issues.

- The System Pillar steering group shall be composed of representatives of the Commission, representatives of the rail and mobility sector and of relevant organisations, the Executive Director of the Europe's Rail Joint Undertaking, the chairperson of the States Representatives Group and representatives of the European Union Agency for Railways and of the ERRAC. The Commission shall take the final decision on the composition of the Group. When justified, the Commission may invite additional relevant experts and stakeholders to attend the meetings of the System Pillar steering group as observers. The System Pillar steering group shall regularly report to the States Representatives Group on its activities.

- The System Pillar steering group shall be chaired by the Commission.

- The recommendations of the System Pillar steering group shall be adopted by consensus. Where no consensus is reached, the Executive Director of the Europe's Rail Joint Undertaking shall prepare a report for the Governing Board, in consultation with the European Union Agency for Railways and the Commission, outlining the key common points and diverging views. In this case, the States Representatives Group shall also prepare an opinion for the Governing Board.

- The System Pillar steering group shall adopt its own rules of procedure.

- The System Pillar steering group shall be responsible for providing advice to the Executive Director and Governing Board on any of the following:
    - o The approach to operational harmonisation and the development of system architecture, including on the relevant part of the Master Plan;
    - o delivering on the specific objective set out in point (c) of Article 85(2), namely:
        - ▪ develop through its System Pillar a unified operational concept and a functional, safe and secure system architecture, with due consideration of cyber-security aspects, focused on the European railway network to which Directive (EU) 2016/797 of the European Parliament and of the Council applies, for integrated European rail traffic management, command, control and signalling systems, including automated train operation which shall ensure that research and

innovation is targeted on commonly agreed and shared customer requirements and operational needs and is open to evolution

- o carrying out the tasks set out in point (a) of Article 86(5), namely:
  - develop in its System Pillar a system view that reflects the needs of the rail manufacturing industry, the rail operating community, Member States and other rail private and public stakeholders, including bodies representing customers, such as passengers and freight and staff, as well as relevant actors outside the traditional rail sector. The 'system view' shall encompass:
    - the development of the operational concept and system architecture, including the definition of the services, functional blocks, and interfaces which form the basis of rail system operations;
    - the development of associated specifications including interfaces, functional requirement specifications and system requirement specifications to feed into Technical Specifications for Interoperability (TSI) established pursuant to Directive (EU) 2016/797 or standardisation processes to lead to higher levels of digitalisation and automation;
    - ensuring the system is maintained, error-corrected and able to adapt over time and ensure migration considerations from current architectures;
    - ensuring that the necessary interfaces with other modes, as well as with metro and trams or light rail systems, are assessed and demonstrated, in particular for freight and passenger flows.
- o the detailed annual implementation plan for the System Pillar in line with the work programmes adopted by the Governing Board in accordance with point (b) of Article 94.
- o Monitoring the progress of the System Pillar.

Effectively, it is the decision-making body for the System Pillar, ratifying the deliverables of the System Pillar, and providing a mechanism to deliver consensus, or a decision/recommendation, where consensus is not possible.

The Composition of the System Pillar Steering Group will be:

- Chair: DG MOVE

- Members: Commission (DG MOVE and DG RTD), EU-Rail, Chairperson of the States Representatives Group, ERA, ERRAC, AllRail, CER, EIM, UNIFE, UITP, UIP

- Observers (technical bodies responsible for providing advice to members): EUG, UIC, UNISIG, UNITEL

- Observers (other): ERTMS Coordinator, EPF, EUSPA, ETF, NB-Rail, RNE

The composition of the System Pillar Steering Group may change over time. Additional participants may be invited on ad hoc basis depending on the subject matter to be discussed.

Meeting inputs shall be provided primarily by the System Pillar Core Group, via the Executive Director of the JU.

15.1.1 The System Pillar Core Group (SPC)

The **System Pillar Core Group**, under the supervision of the EU-Rail Executive Director and/or his delegated Head(s) of Units, leads the day-to-day work of the delivery of the System Pillar through its Tasks. This includes the following responsibilities:

- Programme Management of the System Pillar

    o lead the day-to-day work of the delivery of the System Pillar Tasks,

    o provide the necessary elements to the EU-Rail System Pillar Unit for the System Pillar Steering Group decision making process,

    o monitor and manage System Pillar progress,

    o report to the System and Innovation Programme Board (ED-SIPB) on progress and resource allocation, as well as any other matter requested by the ED-SIPB,

    o manage the resources made available within the specific contracts and any other relevant resources that EU-Rail may consider needed to achieve the System Pillar objectives, in line with the governance process established by the JU.

    o proposal for adaptation of Task structure, according to the developing standardisation need during project lifetime

- Content and Guidance

    o lead the development of the system architecture and operational concept, ensuring objectives are achieved with outputs of the necessary quality, proposed TSI enhancements and harmonised standards are validated in view of submission to the relevant System Pillar decision-making process,

    o manage and coordinate Task alignment, with specific emphasis on

        ▪ Operational concept

            • Define the strategy to be followed to design the operational concept

            • Ensure and verify consistency between Tasks

        ▪ Architecture

            • Define the strategy to be followed to design the system architecture.

            • Ensure and verify architecture consistency between Tasks

        ▪ Migration

            • Define the strategy to be followed to design the migration steps

            • Ensure and verify consistency between Tasks

- o manage central Engineering Services and Administrative Services into Task 1 and Task 2…n

- o manage technical/operational developments within the System Pillar, supporting decision making and progress within the remit set by EU-Rail, including active guidance of Domain teams within the Tasks, in particular through the Railway System (Task 1) and the Operational Design and Architecture and Release Coordination Team (Task 2…n),

- o manage and coordinate the Task 2…n Operational Design teams Task 2…n Architecture and Release Coordination domain team for selected interfaces work together with the JU to ensure sector alignment,

- o ensure System Pillar coordination with Innovation Pillar and its Flagship Areas system experts.

- Specific inputs

  - o integrate relevant inputs from the Innovation Pillar and/or take into account factors external to the EU-Rail Programme,

  - o escalate to the ED-SIPB, via the Head of System Pillar Unit any risks, opportunities and issues which may affect the overall EU-Rail R&I Programme, e.g. alignment with the Innovation Pillar or its specific activities, inconsistent national and/or regional programmes.

- Specific outputs

  - o prepare and maintain the "Standardisation and TSI input plan" ensuring with the JU alignment at rail stakeholder's level and at European Standardisation Organisations (ESOs), and International Standardisation Organisations (ISOs),

  - o monitor that the relevant EU-Rail outputs to the TSI and standardisation process are in line with the overall Operational Concept and System Architecture and associated principles, that these outputs are delivered on time and in scope and that they do incorporate the successful R&I outputs of the Innovation Pillar activities (or from S2R Programme),

  - o determine with the JU the liaison with ERA including handling of change requests to TSIs, EECT and working group representation,

  - o Handling of standardisation requests

The composition of the System Pillar Core Group is:

- Chair: EU-Rail (Head of System Pillar Unit)

- Members:

  - o 4 to 8 FTE equivalent representing a balanced input from the railway and supply industry and in any case no more than 8 persons

- o 2 FTE from ERA
- Additional support from EU-Rail, as required

The System Pillar Core Group shall meet indicatively on a weekly basis to manage day-to-day activities. The SPC Chair shall invite the participants by a written notice (e.g. by email) five working days prior to a SPC meeting. The invitation shall include an agenda. The members of the SPC shall be prepared for their contributions according to the agenda.

15.1.2 The System Pillar Engineering Services / Coordination

The core services will be managed and lead by the System Pillar Core Group, according to the needs of the System Pillar Tasks. Exceptionally, the PRAMSS Management and Assurance team will be led by a joint leadership team between railways and suppliers, in line with the leadership principle of the Tasks Domain Teams.

15.1.2.1 (Central) Modelling service

The Modelling Service includes methods & tools definition for the whole system Pillar, support of the modelling platform, and derives and maintains the CDM catalogues. Specifically, the responsibilities include:

- Provide the central modelling service that converts conceptual inputs or external model fragments into harmonised model aspects in the central model master.

- Design tests and perform model proving for the overall model validation

  - o Design and describe the engineering process in the System Pillar (along ISO15288) with roles, working steps and type of artefacts; processes change requests and proposals to the processes and methods

  - o Choose, develop and provide the documentation, concept, architecting and modelling handbook (MBSE), the ontology, the architecting framework, and the Railway Dictionary

  - o Design, hosts and maintains the central tool platforms and concept/model/CDM databases and edits and consolidates their content as a central service

- Manage relevant licences and technical support for the necessary technical modelling software.

- Requirements management platform and methods and moderation of the creation, negotiation and CCM process for requirements

- Assure the coherence, quality, and completeness of the full requirement implementation (requirements from all sides, like from Task 1 or between other Tasks or domains), as well as for the processes and interfaces between tasks

- Provide document management platform and methods, such as the repository for conceptual documents, coordination of the translation of concepts into formal models and derived views and exports like for CDM

15.1.2.2 Standardisation and TSI Input planning

The "Standardisation and TSI Input planning" service is mainly structured along the catalogue of processes and interfaces/systems. Its responsibilities include:

- Coordination of the Standardisation and TSI Input planning process with the Tasks Domain Teams and the Innovation Pillar System Experts

- Input to the validation and decision process of the Standardisation and TSI Input plan

- Follow up progress reporting of the Standardisation and TSI Input plan implementation

15.1.2.3 External Architecture Support

System architects are very scarce resources. This central pool of (external) architects will support the SP Core Group (e.g. architectural issues on top level), the modelling service, the Tasks or single domains on demand. The responsibilities include:

- Provide expertise on formal system architecture to build upon a systemic and recognized methodology

- Complementing Domain experts of the rail sector, to properly structure the concept of operations and future rail system architecture.

- Support the activities of Task 1 and Task 2…n

15.1.2.4 PRAMSS Management & Assurance Team

In addition to the Modelling Service that is moderating the requirements flow, the PRAMSS requirements (most of the non-functional requirements) are additionally coordinated centrally. This includes top-level design and assurance of the requirement implementation in the System Pillar Tasks. The responsibilities include:

- Defining strategies (e.g. safety strategy), policies, methods (e.g. concerning security design)

- PRAMSS definitions (From existing to target) on top-level

- Assure requirement implementation in the System Pillar Tasks

- Coordinate and support Tasks and Domain Teams in the breakdown process for the PRAMSS requirements:

  - PRAMSS definitions (From existing to target)
  - PRAMSS Target objectives definition per System and components
  - PRAMSS KPIs definition
  - PRAMSS Assurance Processes definition
  - PRAMSS standardisation and PRAMSS breakdown to components
  - Application standardisation, PRAMSS framework, PRAMSS quantitative design
  - PRAMSS assurance, PRAMSS validation of design proposals

15.1.3 The System Pillar Administrative Services

15.1.3.1 Programme Office

The Programme Office will support all the activities of the System Pillar including:

- Support the Core Group in the day-to-day management and delivery of System Pillar objectives

- Continuous monitoring and management of progress

- Management of resources and administration

- Quality Management

- Publications and communication, under the supervision and coordination of the Communication and Dissemination structure of the JU

15.1.3.2 Economic Analysis

Economic analysis supporting the activities of the System Pillar, for example:

- Support cost-benefit analysis of potential changes

- Support economic analysis of specific enhancement change requests

- Analysis of specific business cases as a service

15.1.4 Task 1: Railway System

In the System Pillar Task 1 the Business Process Architecture and Operational Design (Organisational needs, Generic automation needs, …) for the Railway System (Railway System as defined in the Single Basic Act i.e. focused on the European railway network to which Directive (EU) 2016/797 (Article 1) applies – the "heavy" rail network in the EU) will be specified, based on, and reflecting the Common Business Objectives. More specifically, the main ambition for the Task 1 System Levels is to get a complete list of the needed and important improvements (as-is analysis, pain-points) in selected interaction processes as input in form of a requirement set to the different Tasks 2…n. These improved business process solutions will, to the extend needed, describe the rationale behind the requirements of the to-be target Business Process Architecture and Operational Design. The design work for Task 1 is not intended to describe all process and improvement aspects of the full railway system in full detail, especially when no need for standardisation inside of the System Pillar is identified.

Figure 13 - Task 1: Railway System

Task 1 responsibilities include:

- Conduct an as-is analysis of the railway system, considering operational, functional, logical & physical assets

- Identifying the pain points for selected operational interaction processes and derive a requirement set reflecting the Common Business Objectives

- Specification of the Business Process Architecture and Operational Design (Organisational needs, Generic automation needs, …) for the (to-be) Railway System

- Assess migration roadmap of the Tasks 2…n regarding overall Business Process Architecture and Operational Design consistency

- Assign input requirements to lower-level tasks

15.1.5 Task 2…n

The Tasks that execute the detailed design work for the lower System Levels 3, 4 and 5 are defining detailed operational processes and requirements, functional system analysis and technical architecture. They are structured in Domain teams for cross-cutting activities and (Sub-)System Design activities that need to be managed and coordinated:
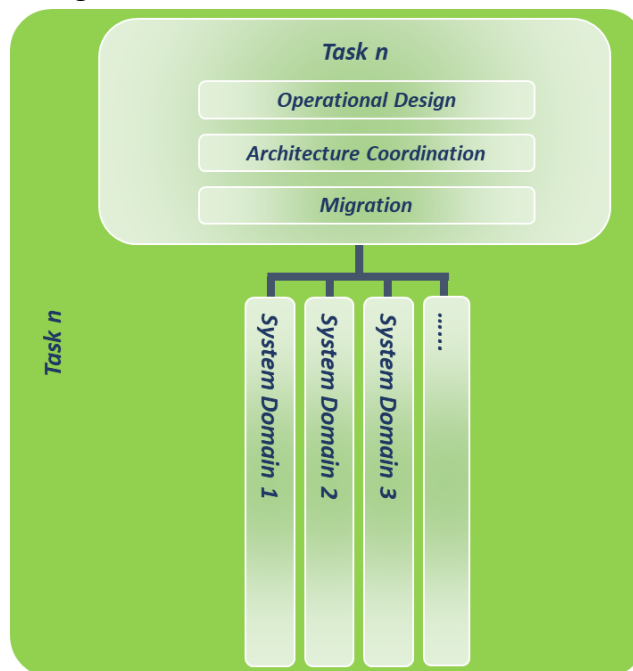
Figure 14 – Task 2..n General Structure

- Cross-Cutting activities:
  - Operational design process
  - Architecture coordination process
  - Migration design and architectural support
- (Sub-)System design activities:
  - Precise specification (FRS, SRS)
  - Coordinate for sub-systems with cross-cutting teams

The activities are carried out by Domain Teams, which are led by joint leadership teams, as pair from railways and suppliers. The team size will be adapted as needed in order to deliver the assigned specification work. The team shall always be staffed in a balanced way between railways and suppliers, if possible. In case there is insufficient resource available or not suitable as deemed, direct resources outside of the sector organisations or their members could be contracted to support the domain teamwork.

The different Tasks 2…n shall be connected (where appropriate) by simple interfaces/process interactions. These will be defined early and decouple the dependencies in the development work. Depending on size and scope of tasks, the roles of Domain Teams above can be shared by a single team or distributed across multiple teams (e.g. initial teams for Tasks that have lower maturity, the cross-cutting may be combined with the system design activities). If it exists, work already developed outside the System Pillar may be synthesised and incorporated by the Task (e.g. in the System Pillar ramp up, a large part of the work is to consolidate the already very detailed work from the sector, S2R etc. in the CCS subsystem).

15.1.5.1 General Domain Teams

The System Pillar Domain Teams are leading the day-to-day architecture specification and system design work of the delivery of the System Pillar.

Each team has, within their Domain scope, the following responsibilities:

- Ensure sector alignment according to the Common Business Objectives
- Cooperation with FAs Innovation Pillar System Experts (if corresponding FA is available)
- Coordination with other Domain teams
- Managing inputs
  - Integrating relevant inputs from the Innovation Pillar and external to JU
- Managing outputs
  - Contributing to system model artefacts of their respective domain
  - Delivering specifications according to the TSI and standardisation input plan

- Lead the system design work

    o Refinement of the domain functional architecture

    o Precise breakdown of system requirements

    o Design functional chains inside of the domains

    o Specify functionality and interfaces

    o Validate specification (model proofing)

    o Contribute to preparing and validating Change Requests

    o Align requirements towards Innovation Pillar FAs and external Systems

- Lead the work for drafting specifications, where needed as an identified input, to fulfil the Standardisation and TSI Input Plan

- Support ERA in its role as ERTMS and Telematics System Authority in their consideration of TSI enhancements

15.1.5.2 Cross-Cutting Domain Teams responsibilities

15.1.5.2.1 The Operational Design Team

The Operational Design Team is responsible for:

- Define the Operational Target Concept as part of the system design process

- Translate business objectives into operational target processes (business re-engineering)

- Analyse operational legacy/diversity/migration trade, operational solution design

- Derive and maintain standardized operational requirements

- Support and guide technical design teams for functional requirements & harmonization according to target operational processes

15.1.5.2.2 The Architecture and Release Coordination Team

The Architecture and Release Coordination Team is responsible for:

- Define the strategy to be followed for designing and releasing of the fully integrated system architecture

- Collect and evaluate all the existing work (research projects, state-of-the-art documents) as input to design the System architecture

- Coordinate the work and inputs of the Tasks Architecture-linked Domain Teams and cross-cutting teams

- Continuous Interaction with the IP and SP Core group and SP domains to provide and receive inputs and mediate conflicts

- Design/develop/maintain the System Architecture according to the defined principles, the existing work and to the Operational concept into Functional & Logical architecture

- Design architectural roadmap and migration, ensuring "integrity per migration step"

- End2End integration of functional chains, assure architectural quality on Task level

- Ensure and verify architecture consistency on functional and logical level

- Manage the input to the standardisation and TSI plan for Task activities and issue the input according to the "TSI and Standardisation input plan"

- Coordination with the Cross-Cutting Domain Teams of other Tasks to ensure overall consistency regarding architecture and release coordination

- Organize plenary meetings with all Domain leadership teams to share status reports between all teams

15.1.5.2.3 The Migration and Roadmap Team

The Migration and Roadmap Team is responsible for:

- Analyse national situations, product and deployment constraints

- Design standard architectural migration roadmaps, principles and derive system requirements

- Design operational process migration roadmap, principles and process requirements (including initial intermediate scenarios)

- Decide interface forward and backwards compatibility for migration and safe investments

- Continuous interaction with the Architecture and Release Coordination Team

15.1.5.2.4 Task 2: CCS System Design Teams

The figure below illustrates the CCS Task Domain Team structure.
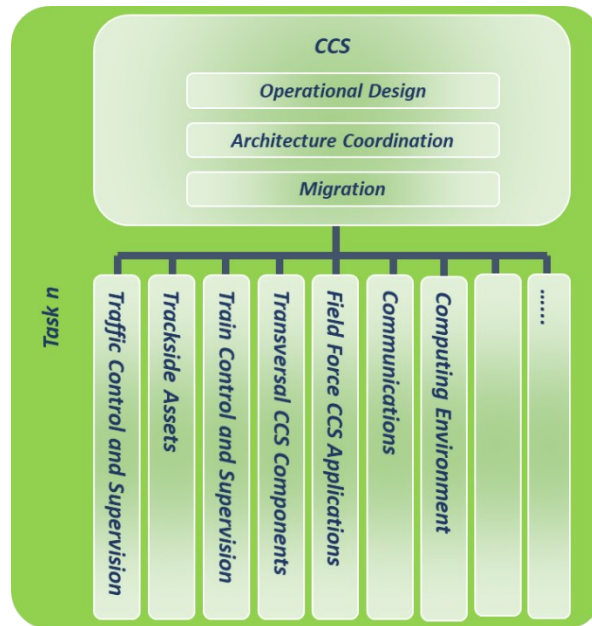
Figure 15 - Task 2: CCS

15.1.5.2.5 The Traffic Control and Supervision Team

The Traffic Control and Supervision Team is responsible for:

- Traffic Control System Interfaces standardisation Management/Maintenance (Internal-External interfaces)

- Traffic Control System Functional Architecture and requirements Management/Maintenance

- Traffic Control System Logical Architecture and requirements Management/Maintenance

- Traffic Control System Physical Architecture and requirements Management/Maintenance

- Traffic Control System Data sharing Management/Maintenance

- Ensure alignment and close cooperation with Innovation Pillar Flagship Area 2

- Covers Yard/Depot/Terminals Team

    o Yard/Depot/Terminals System Interfaces standardisation Management/Maintenance (Internal-External interfaces)

    o Yard/Depot/Terminals System Data sharing Management/Maintenance

    o Proposal of Yard/Depot/Terminals System TSI input.

- Covers Station CCS Systems Team

    o Station CCS System Interfaces standardisation Management/Maintenance (Internal-External interfaces)

    o Station CCS System Data sharing Management/Maintenance

    o Proposal of Station CCS System TSI input.

15.1.5.2.6 The Trackside Assets Control & Supervision Team

The Trackside Assets Control & Supervision Team is responsible for:

- The Trackside Assets Interfaces standardisation Management/Maintenance (Internal-External interfaces)

- The Trackside Assets Data sharing Management/Maintenance

- Ensure alignment and close cooperation with Innovation Pillar Flagship Area 2

15.1.5.2.7 The Train Control and Supervision Team

The Train CS Team is responsible for:

- Train CS System Interfaces standardisation Management/Maintenance (Internal-External interfaces)

- Train CS System Functional Architecture and requirements Management/Maintenance

- Train CS System Logical Architecture and requirements Management/Maintenance

- Train CS System Physical Architecture and requirements Management/Maintenance

- Train CS System Data sharing Management/Maintenance

- Ensure alignment and close cooperation with Innovation Pillar Flagship Area 2

15.1.5.2.8 The Transversal CCS Components Team

The Transversal CCS Components Team is responsible for:

- Engineering & Data Topology (map)

    o Define in cooperation with the other SP Domains and IP the standardized set of data;

    o Define methods and tools to prepare and share the data between systems and stakeholders.

- Provide Asset Condition data and technical intervention management

    o Specify the minimal standard functionality, interfaces and protocols to collect asset condition data from CCS-external asset management systems and provide them as a service for the CCS systems;

    o Provide a system specification for an integrated technical diagnostic system on CCS level.

- CCS Configuration Management

    o Define methods/protocol/data to be shared by the system components;

    o Define the configuration management set of functions to be provided as a basis for a standardized management process on network level for CCS systems.

- Security systems for systems and persons

    o Specify the standard functionality, interfaces and protocols for security systems like identity and access management, security monitoring, etc.;

    o Requirements (security, roles) definition to access the system;

    o Define methods and tools to interact with the whole railways system.

- [Provide integrated user interface]
  - o Specify a workbench system that integrates different user interfaces services from different CCS systems;
  - o Define a user interface framework to include all the components user interfaces;
  - o Define methods and tools to be integrated in the framework.

15.1.5.2.9 The Field Force CCS Applications Control and Supervision Team

The Field Force CCS Applications (like for trackworker safety, production information/TMS input for field forces - but not track bound applications) Control and Supervision Team is responsible for:

- Field Force CCS Applications CS System Interfaces standardisation Management/Maintenance (Internal-External interfaces)
- Field Force CCS Applications CS System Functional Architecture and requirements Management/Maintenance
- Field Force CCS Applications CS System Logical Architecture and requirements Management/Maintenance
- Field Force CCS Applications CS System Physical Architecture and requirements Management/Maintenance
- Field Force CCS Applications CS System Data sharing Management/Maintenance

15.1.5.2.10   The Communications Team

The Communications Team is responsible for:

- Identify together with all other SP domains, as well as relevant Innovation Pillar FAs, all the railways system interfaces
- Define/propose communication solutions (Media, protocols, ...)
- Coordinate FRMCS related aspects
- Ensure alignment and close cooperation with Innovation Pillar Flagship Area 2

15.1.5.2.11   [The Computing Environment Team]

The Computing Environment Team is responsible for:

- Input Business Analysis to support the decision regarding setting up a standardisation Domain Team and propose standardisation scope of the Computing Environment

15.1.5.2.12   Task 3: TMS System Design Teams

The figure below illustrates the TMS Task Domain Team structure.
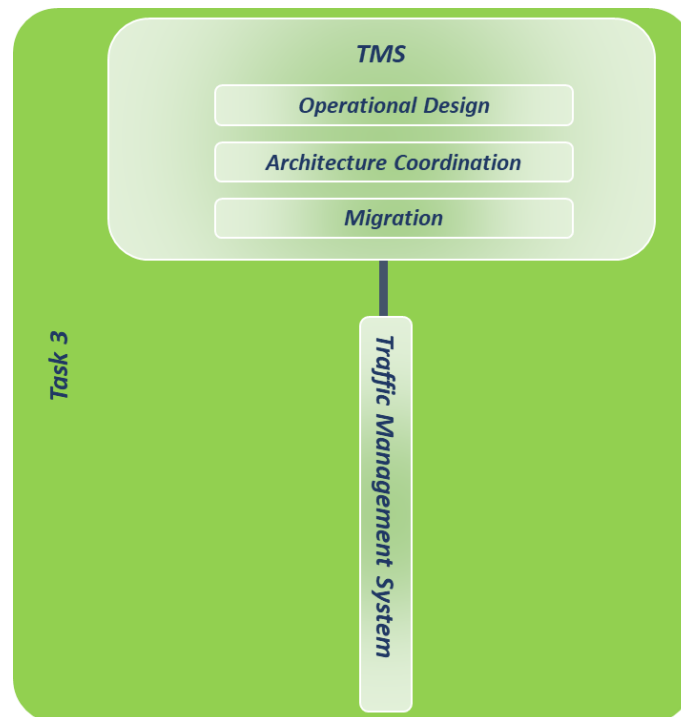
Figure 16 - Task 3: TMS

15.1.5.2.13   The Traffic Management Team

The Traffic Management Team is responsible for:

- Manage cross-cutting activities for Task 3
    - Conduct an as-is analysis of the railway system, considering operational, functional, logical & physical assets and identifying the pain points
    - Assign prioritized pain points to existing domain teams or propose new domain teams
    - Propose a to-be (target) Functional System Architecture of the railway system
    - Propose a railway system architecture migration roadmap
- Manage the input to the standardisation and TSI plan for Task 3 activities
- TMS Interfaces standardisation Management/Maintenance (Internal-External interfaces)
- TMS Functional Architecture and requirements Management/Maintenance (Allocated to TMS)
- TMS Logical Architecture and requirements Management/Maintenance
- TMS Physical Architecture and requirements Management/Maintenance
- TMS Data sharing Management/Maintenance
- Ensure alignment and close cooperation with Innovation Pillar Flagship Area 1

15.1.5.2.14   Task 4: DAC/FTDFTO System Design Teams

The figure below illustrates the DAC/FTDFTO Task Domain Team structure.
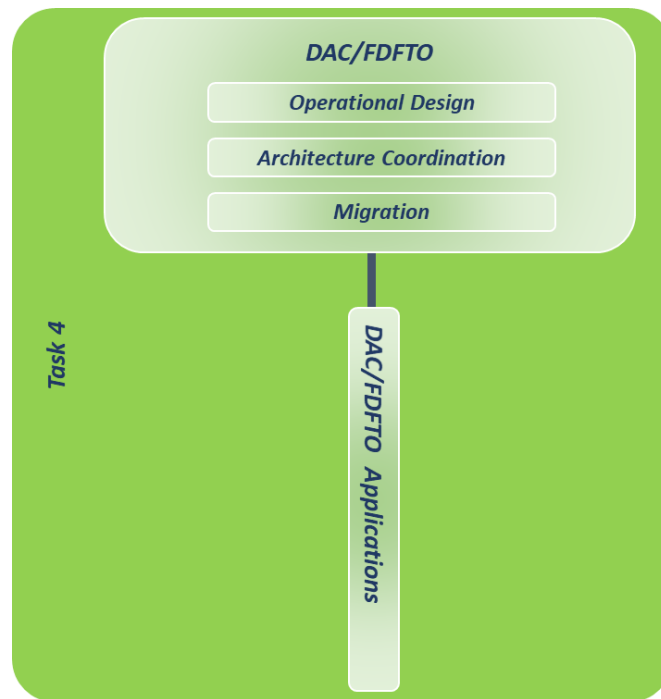
Figure 17 - Task 4: DAC/FDFTO

15.1.5.2.15   *The DAC/FDFTO Applications Team*

The DAC/FDFTO Applications Team is responsible for:

- Manage cross-cutting activities for Task 4 (only if necessary for level 3/4/5) – to be finally agreed with EDDP and FA5

    o   Conduct an as-is analysis of the railway system, considering operational, functional, logical & physical assets and identifying the pain points related to DAC/FDFTO

    o   Assign prioritized pain points to existing domain teams or propose new domain teams

    o   Propose a to-be (target) Functional System Architecture of the railway system related to DAC/FDFTO

    o   Propose a DAC/FDFTO architecture migration roadmap

- Manage the input to the Standardisation and TSI Input Plan for Task 4 activities

- Review input from EDDP (European DAC Delivery Program) and FA5 on Operational Concept, check with consistency and include in overall Operational Concept, including for CCS-related processes in collaboration with Task 2 coordinated by the System Pillar Core Group

- Provide an overall description of the System Architecture elements on a functional level regarding FDFTO (Full Digital Freight Train Operations) and seamless rail freight according to the defined principles in cooperation with the Innovation Pillar.

- 'Translate' the Operational concept into Functional architecture, design and maintain the Logical Architecture (Apportionment of the functional blocks) and design and maintain the Physical Architecture regarding FDFTO and seamless rail freight in cooperation with the Innovation Pillar

- Ensure close alignment and cooperation with Innovation Pillar Flagship Area 5 and EDDP@EU-RAIL

- Support FA5 regarding authorisation strategy and EDDP regarding migration strategy

- Check CBA provided by EDDP and FA5 for consistency with CBO

Annex I: System Pillar preliminary reference use cases in the System Pillar activities

In this Section the procedure descriptions between the different organizational units of the System Pillar is specified, based on the responsibilities defined in the main document of the Governance organization. This is indicative and will be updated. Open points:

- Rules for Standardisation and TSI Input plan population (e.g. regarding output channel and grade selection) are out of scope of this Section.
- The System Pillar decision-making process, as described in the main document, is a hierarchical process, from the lowest (technical) level (Domain Teams) to the highest level (Governing Board). In order to maintain a lean structure, the procedure descriptions in this Section stop at the level of the System Pillar Steering Group. The final validation and decision step between System Pillar Steering Group and the Governing Board is not yet covered.
- Procedure description to be added: Assess and validate the bundle of error corrections CRs with ERA (periodic CCS error corrections bundle).

16.1 The System Pillar Steering Group

The procedure desciptions in this Section are supporting the formal decision process between the different bodies of the governance organisation of the System Pillar. They are indicative and shall serve as principle guidelines for the organisational units. Those reponsible for each process as defined in the relevant descriptions below have to organize the work accordingly. The process desciptions are subject to change during the System Pillar lifetime, where deemed necessary. Changes to this Section can be requested through the System Pillar Core Team.

In the following procedure desciption the working circles are marked as optional, to give an indication where the working circles might be involved to get feedback from the sector. As such, working circles are managed by the SPC on demand to prepare any decision of the System Pillar Steering Group, hence the mentions below are not extensive.

16.1.1 System Pillar Mediation process

16.1.1.1 Mediation Process to Ensure Sector Alignment

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R:** SP Core Group (SPC) • **C:** SP Domain Team (SPDT) • **C:** IP System Experts (FPSE) • **A:** SP Steering Group (SPSG) • **(C):** Working Circle (WCs) • **I:** System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Common Business Objectives agreed and released
Triggers	• A conflict where unanimous decision cannot be reached, either within the SPC or an SPDT • ED-SIPB decides to launch process to resolve a conflict • SPSG requests to launch process to resolve a conflict
Frequency	• On demand
Input	• Conflict description on the decision to be taken, with mutually agreed common understanding of the issue
Process description	• The conflict description is prepared by the stakeholders and mutually agreed and forwarded to the SPC • The SPC decides on the Common Business Objectives that are relevant for the issue • The SPC prepares itself or requests from the stakeholders (e.g. SPDT, or FPSE, or SPC member) a rational for their position on the basis of the selected Business Objective • [Optional] The SPC involves a working circle to discuss the positions with the sector • The SPC evaluates the rational and concludes on a position that shall be mutually agreed within the SPC

	• [Optional] If no common position can be reached SPC triggers process 0 (• Escalation of topic to SP Steering Group) • The SPC forwards the issue description, CBO rational and conclusion to the SPSG for validation and decision
Output	• SPSG validated issue decision

16.1.1.2 Mediation Process to decide on the need of an interface specification

Note: The definition of the Standardisation and TSI Input Plan is described in a dedicated process to decide on a general standardisation strategy. This mediation process is used to resolve issues on the need of interface specifications and the corresponding granularity.

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R:** SP Core Group (SPC) • **C:** SP Domain Team (SPDT) • **C:** IP System Experts (FPSE) • **A:** SP Steering Group (SPSG) • **(C):** Working Circle (WCs) • **I:** System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Common Business Objectives defined and released • Operational Process description defined and released • Architecture Splitting rules defined and released
Triggers	• SPDT has a conflict where unanimous decision cannot be reached • FPSE request conflict resolution to SPDT, where unanimous decision cannot be reached
Frequency	• On demand
Input	• Conflict description on the decision to be taken, with mutually agreed common understanding of the architectural or technical issue

Process description	• The technical conflict description is prepared by the stakeholders, mutually agreed and forwarded to the SPC
	• The stakeholders submit a proposal for decision criteria to the SPC, e.g.:
	    o Architecture Splitting rule
	    o Operational Process improvement
	    o Common Business Objectives
	• The SPC decides on the relevant criteria for the issue
	• The SPC requests from the stakeholders (e.g. SPDT, or FPSE) a rational for their position on the basis of the criteria
	• [Optional] The SPC involves a working circle to discuss the positions with the sector

	• The SPC evaluates the rational and concludes on a position that shall be mutually agreed between the SPC • [Optional] If no common position can be reached SPC triggers process 0 (• Escalation of topic to SP Steering Group) • The SPC forwards the issue description, criteria evaluation and conclusion to the SPSG for validation
Output	• SPSG validated issue decision

16.1.2 System Pillar Planning

16.1.2.1 Update of Standardisation and TSI Input Plan

Stakeholders	• **A**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Core Group (SPC), with Engineering Service team • **C**: Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (FPSE) • **C**: SP Steering Group (SPSG) • **(C)**: Working Circle • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	•
Triggers	• Periodically • Update request of an eligible stakeholder for a plan which has been previously validated
Frequency	• Annually • On demand
Input	• Standardisation and TSI Input Plan

Process description	• SPC coordinates overall Standardisation and TSI Input Plan planning across Tasks
	• Per Task ARCT consolidates standardisation proposals from all SPDTs, including external enhancements evaluation, and coordination of architecture design roadmap and releases
	• FPSE consolidate standardisation proposals from FA Innovations and sends it to ARCT for integration. ARCT together with responsible SPDTs decides on integration of FPSE proposals.
	• ARCT analyses and assesses all standardisation proposals and maintains as Standardisation and TSI Input Plan containing
	    ○ Type
	    ○ Topic
	    ○ Date

	o Responsible SPDT o Proposed standardisation channel (Publication by System Pillar, Standardization, Regulation by TSI) o Proposed grade (Strict specification, Core specification, Market specification, Guideline) • SPC consolidates overall Standardisation and TSI Input Plan and reviews proposals (with ERA and DG MOVE) and updates if required • [Optional] SPC reviews proposal with Working Circle • SPC triggers process • • Validation of Standardisation and TSI Input Plan (0) • SPC triggers • Publication according to validated Standardisation and TSI Input Plan (0) • SPC triggers Share Standardisation and TSI Input Plan with ERA (16.1.7.1) • SPC triggers Share Standardisation and TSI Input Plan with RASCOP (16.1.8.1)
Output	• Consolidated Standardisation and TSI Input Plan, ready for validation of SPSG

16.1.2.2 Manage technical priorities of Tasks

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Core Group (SPC) • **C**: SP Domain Team (SPDT) • **C**: SP Architecture and Release Coordination Team (ARCT) • **(C)**: FP System Experts (FPSE) • **A**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• SPC prepared 5 years planning for System Pillar, validated and released via SPSG • Annual Project planning updated by SPC, validated and released via SPSG
Triggers	•
Frequency	• Annual update • Single SPDTs on demand
Input	• Validated 5 years planning (Scope of current year) • Validated Standardisation and TSI Input Plan
Process description	• SPC requests work plan from all Tasks (e.g. ARCT)

	• Each ARCT coordinates with the SPDTs of the Task the work plan with technical priorities according to requirements of
	    ○ Validated 5 years planning (Scope of year-to-date)
	    ○ Validated Standardisation and TSI Input Plan
	    ○ Functional scope for the Domain as defined in operational concept to be prioritized
	    ○ Functional scope for the Domain from new innovation topics (with FPSE)
	• ARCT to reviews and resolve dependencies between SPDTs or FAs
	• SPC with ARCT to consolidate overall work plan for System Pillar and resolves dependencies between Tasks in the Work Programme
	• SPC requests validation via SPSG

Output	• Updated and validated work plan

16.1.2.3 Define and assign external design activity

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R/A**: SP Core Group (SPC) • **C**: SP Domain Team (SPDT) • **C**: SP Architecture and Release Coordination Team (ARCT)
Pre-conditions	•
Triggers	• External resources required to fulfill workplan
Frequency	• On demand
Input	• Defined system design activity that can be delivered as independent item
Process description	• SPDT or ARCT requests from SPC to assign a system design activity to an external working body • SPC with SPDT defines remit for specification work of external body, including schedule as per Standardisation and TSI Input Plan • External body prepares specification element and delivers to SPC • SPC follows Verify input document through Domain team (16.1.3.1) • SPDT with ARCT integrates specification and aligns SP architecture
Output	• Specification element prepared by the external body is fully integrated into the SP architecture

16.1.3 System Pillar System Design

16.1.3.1 Verify input document through Domain team

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R/A**: SP Core Group (SPC) • **C**: SP Domain Team (SPDT) • **C**: SP Architecture and Release Coordination Team (ARCT)
Pre-conditions	•
Triggers	• New external document becomes available
Frequency	• On demand per process
Input	• Document from external stakeholder in scope of SP
Process description	• SPC receives a document prepared from IP or a stakeholder outside of the JU • SPC screening of the document to ensure that document is in scope of the SP system design activities • SPC and ARCT define responsible SPDT for evaluation • ARCT includes input document in work items of SPDT and defines priority • SPDT evaluates document (economic and operational impact, relevance, maturity, compliance to architecture…) • SPDT propose integration strategy for document • ARCT and SPC verify strategy and confirm decision
Output	• Integration strategy for external document decided

16.1.3.2 Evaluate level of impact

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Core Group (SPC) • **C**: SP Domain Team (SPDT) • **R**: SP Architecture and Release Coordination Team (ARCT) • **(C)**: FP System Experts (FPSE) • **I**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Architecture element has been decided as part of the Standardisation and TSI Input Plan • Design has been validated and agreed by SPDT
Triggers	• A stakeholder (e.g. another SPDT, or FPSE) requests a change for the architectural element
Frequency	• On demand
Input	• Change request for architecture element

Process description	• SPDT or FPSE submits change request for architecture element to ARCT • ARCT assesses change proposal with affected SPDTs • If one stakeholder (ARCT & SPDT leads) assesses a high impact (technical, operational, economic) of the proposed change a validation via the SPSG must be prepared SPSG prior to acceptance • [Optional] ARCT requests SPC to mediate conflict • ARCT ensures logging of any change in a change journal which is open for information to sectors representatives
Output	• Decision for change request validation via SPSG

16.1.3.3 Define Harmonized Operational Processes

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Core Group (SPC) • **R/C**: Task 1 Railway System Domain Team (T1.RSDT) • **R**: Task 2..n Operational Design Domain Team Team (ODDT)
Pre-conditions	• Common Business Objectives released
Triggers	• Work plan according to validated Standardisation and TSI Input Plan
Frequency	• On demand
Input	• Validated Standardisation and TSI Input Plan
Process description	• T1.RSDT performs the as-is analysis for the railway system • T1.RSDT derives pain points for selected operational interaction processes and derives a requirement set reflecting the common business objectives • T1.RSDT specifies a harmonized Business Process Architecture and Operational Design (organizational needs, generic automation needs, …) for the (to-be) railway system, assigning pain points to be resolved and high level requirements to the System Pillar Tasks 2..n • T1.RSDT requests validation and acceptance of deliverable (16.1.5.1) • ODDT receives and integrates T1.RSDT operational requirements and pain points • ODDT proposes a prioritization for list of processes as part of their overall work plan. The priorities are assessed and validated in order to • Manage technical priorities of Tasks (0)

	• ODDT follows per process to be harmonized and improved in a re-design of the process • ODDTT requests per Operational Process description • Preparation of Task output (0)
Output	• Harmonized Operational Process description ready for breakdown in architecture

16.1.3.4 Process requirement allocation (functional, non-functional and PRAMSS)

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I**: SP Core Group (SPC) • **C:** SP Domain Team (SPDT) • **A/R**: SP Architecture and Release Coordination Team (ARCT) • **C:** SP Operational Design Domain Team (ODDT) (OHT) • **C:** SP PRAMSS Management & Assurance Team (PMAT) • **C:** SP Migration & Roadmap Team (MRT)
Pre-conditions	• Harmonized Operational Process description, validated by SPSG
Triggers	• Updated Harmonized Operational Process description received
Frequency	• On demand per process
Input	• Harmonized Process description with defined process requirements • High-level PRAMSS requirements

Process description	• ARTC receives updated operational process requirements
	• ARCT assesses the impact of the process requirements on the current architecture and involves SPDT that are impacted
	• ARCT, if the assessment is positive, brakes down the process requirements to "system requirements" for the domain teams:
	    ○ ARCT is preparing the functional allocation of the requirements
	    ○ ARCT requests from PMAT update and allocation of non-functional and PRAMSS requirements
	    ○ ARCT requests from MRT a migration strategy for architecture and operational processes
	• ARCT requests integration of system requirements from affected SPDTs

Output	• System level requirements for Operational Process allocated to SPDTs

16.1.3.5 Preparation of Task output

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Core Group (SPC) • **R**: SP Domain Team (SPDT) • **C**: SP Operational Design Domain Team (ODDT) • **C**: SP PRAMSS Management & Assurance Team (PMAT) • **C**: SP Migration & Roadmap Team (MRT)
Pre-conditions	• Remit for deliverable and work plan of SPDT validated by SPC
Triggers	• SPDT is requested to prepare a deliverable
Frequency	• According to work plan
Input	• SP Cross-Cutting Teams have allocated requirements regarding the deliverable
Process description	• SPDT defines lead author to develop the deliverable • [Optional] Lead author integrates sector or other contributions in the creation of the deliverable • SPDT nominates internal Quality Review Team for the deliverable to ensure draft review readiness. The lead author shall not be part of the Quality Review Team • SPDT requests ODDT, PMAT, MRT verify if the input requirements are addressed • SPDT invites SPC to perform a review of the deliverable • SPDT invites sector organizations to perform a formal review • SPDT prepares update of document, incorporating sector feedback, and prepares a summary and conclusion
Output	• Deliverable is ready for approval via SPSG

16.1.3.6 Publication according to validated Standardisation and TSI Input Plan

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R/A**: SP Core Group (SPC), with Programme Office • **C**: SP Domain Team (SPDT) • **C**: SP Architecture Release Coordination Team (ARCT) • **I**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• SPSG validated Standardisation and TSI Input Plan
Triggers	• Periodical monthly publication cycle

Frequency	• Monthly
Input	• Updated documents as defined and validated in Standardisation and TSI Input Plan

Process description	• SPC with Programme Office receives updated documents of SPDTs, according to Standardisation and TSI Input Plan
	• SPC validates document status for all documents with ARCT:
	    ○ Planned
	    ○ Remit approved
	    ○ Internal work
	    ○ Early open draft
	    ○ Draft in sector review
	    ○ Final draft ready for approval
	    ○ Approved
	• SPC publishes all documents in status 'Early open draft' by means of a sharepoint, that can be accessed by sector representative organizations
	• SPC formally publishes all documents starting with status 'Draft in sector review' openly accessible on the Internet

Output	• Early open drafts are published on sharepoint with restricted access
	
	• Documents in status
	    ○ Draft in sector review
	    ○ Final draft ready for approval
	    ○ Approved
	are published on the internet

16.1.4 Innovation Pillar Interaction

16.1.4.1 Release new or updated architecture building block specification from SP to IP (FIS)

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Core Group • **R**: SP Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: FP System Experts (FPSE) • **(C)**: Working Circle • **I**: SP Steering Group • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Architecture building block is part of IP scope (e.g. demonstrator or FFFiS specification)
Triggers	• A new architectural building block specification is validated, released and published according to the Standardisation and TSI Input Plan

Frequency	• ARCT may launch this process on demand
Input	• Released FIS specification for architecture building block with defined functional scope and requirements allocation • Timing constraints or other dependencies

Process description	• ARCT initiates request by sharing the specification document with IP System Experts
	• FPSE verifies specification and may request clarifications from SPDT responsible
	• FPSE prepares a coverage matrix, allocating specified requirements to demonstrators to see coverage of item in FA
	• [Mandatory only if part of call contract] FPSE plans further design work (FFFiS) for the building block
	• Response to be sent to ARCT with evaluation and acceptance result, if positive work shall be started, if negative
	    ○ [Optional] Initiate Working Circle with FPSE/ARCT/SPDT to find compromise
	    ○ Escalation of topic to [SP Steering Group / Program Board]

Output	• Coverage matrix of requirements allocated to demonstrators in the FA, if agreed by the project • [Mandatory only if part of call contract] Acceptance plan with timing to deliver FFFiS

16.1.4.2 Align on updated architecture element from SP

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I/(C)**: SP Core Group • **A/R**: SP Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: FP System Experts (FPSE) • **(C)**: Working Circle • **I**: SP Steering Group • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Update of architecture element already evaluated (operationally, technically, economically) and decided as part of SPDT work
Triggers	• Continuous system level design activity in SP may require the update of an architecture element e.g. an update on specification, requirements, interfaces

Frequency	• ARCT may launch this process on a bi-monthly basis.
Input	• Updated functional scope description defined by SP • Timing constraints or other dependencies

Process description	• ARCT assesses update and evaluates if the change request requires validation through the SPSG (16.1.3.2 Evaluate level of impact)
	• [Optional] 'Validate change request via SP Steering Group 16.1.5.3'
	• ARCT initiates request by sharing the document with IP System Experts
	• FPSE verifies request for (technical, operational, economical) feasibility and acceptance
	• Response to be sent to ARCT with evaluation and acceptance result, if positive, work shall be started, if negative
	    ○ [Optional] Initiate Working Circle with FPSE/ARCT/SPDT to find compromise
	    ○ Escalation of topic to SP Steering Group if needed (0)

Output	• Agreement/Disagreement to start working on architecture element

16.1.4.3 Change Request to architecture element from IP to SP

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I/(C)**: SP Core Group • **A/R**: SP Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (FPSE) • **(C)**: Working Circle • **I**: SP Steering Group • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Architecture element design has been specified in SPDT
Triggers	• Continuous innovation process in IP may require the update of an architecture element, e.g. of functional, logical, physical FiS or FRS specification, data structure or semantic rules
Frequency	• FPSE may launch this process on a bi-monthly basis.

Input	• Description on the change requested, with technical, operational or economic rational

Process description	• FPSE initiates request by sharing the Change Request with the ARCT
	• ARCT receives Change Request and sets up acceptance process within SPDT
	• SPDT may request clarifications from FPSE
	• SPDT executes impact analysis (technical, operational or economical) to evaluate the request and proposes acceptance to ARCT
	• ARCT informs SPC of change request and evaluation result
	• ARCT assesses change request and evaluates if the change request requires validation through the SPSG (16.1.3.2)
	• [Optional] Validate change request through SPSG (16.1.5.3)
	• SPC and ARCT send response to FPSE with evaluation and acceptance result, if positive SPDT executes changes to architecture element, if negative
	    ○ [Optional] Initiate Working Circle to find compromise
	    ○ Escalation of topic to SP Steering Group if needed (0)

Output	• Updated architecture if change request accepted

16.1.4.4 Alignment process between two FAs via SP

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I**: SP Core Group • **A**: SP Architecture and Release Coordination Team (ARCT) • **C**: System Pillar Domain Team (SPDT) • **R**: FP System Experts (FPSE) • **I**: SP Steering Group • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• FPSEs did not resolve the topic bilaterally within the Innovation Pillar
Triggers	• Conflict regarding architecture element between two (or more) FAs, that have been assigned to the Innovation Pillar and that cannot be resolved bilaterally
Frequency	• On demand
Input	• Description of issue and architecture element, including economical assessment
Process description	• FPSE request alignment to the ARCT by submitting issue description

	• ARCT evaluates issue description and decides if request in in responsibility of Task and allocates SPDT • If yes ARCT forwards issue description to responsible SPDT • SPDT may request clarification information from FPSE • SPDT evaluates request and decides based on principles described in 16.1.1.1 • SPDT communicates to FPSE decision • FPSE ensure uptake in respective architecture artefact
Output	• Specification element submitted Output process (ERA for TSI, standardisation or publication)

16.1.4.5 Propose specification element from IP to SP for acceptance

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A/C**: SP Core Group • **R**: SP Architecture and Release Coordination Team (ARCT) • **C**: System Pillar Domain Team (SPDT) • **C**: FP System Experts (FPSE) • **I**: SP Steering Group • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Flagship Area project is responsible for delivering specification element
Triggers	• FPSE provides a new or updated version of a specification element (e.g. FFFIS, model, data requirements, …), ready for submission to ERA CCM or standardisation process
Frequency	• FPSE launches this process on demand
Input	• Specification elements ready for submission
Process description	• FPSE initiates acceptance by sharing the specification documents with ARCT • ARCT receives specification and sets up acceptance process within System Pillar SPDT • SPDT may request clarifications from FPSE • SPDT verifies specification against requirements (FiS specification, economic, operational, migration, others, …) • ARCT may request changes to specification from IP if required criteria are not fulfilled, otherwise document is accepted • ARCT forward to SPC to follow ' • Confirm acceptance of deliverables to SPSG' (0)
Output	• Specification element ready for submission to output channel according to Standardisation and TSI Input plan

16.1.5 System Pillar Steering Group Interaction

16.1.5.1 Validate System Pillar work plan by SPSG

Stakeholders	**R**: Head of EU-Rail System Pillar Unit (HoSPU) **C**: SP Core Group (SPC) **A**: SP Steering Group (SPSG) **I**: System and Innovation Programme Board (ED-SIPB) **I**: SP Domain Teams **C**: Task 1 Railway System Domain Team (T1.RSDT) **C**: SP Architecture and Release Coordination Team (ARCT)
Pre-conditions	• Released 5 years planning document
Triggers	• SPC project planning requires new mandate
Frequency	• After tender process • Annual update
Input	• Call text • 5 years planning document
Process description	- SPC creates or updates project planning document for next project phase, according to ○ 5 years planning ○ Updated Standardisation and TSI Input Plan ○ Resource and budget constraints ○ Call text - SPC follows Update of Standardisation and TSI Input Plan <table><tr><td>Stakeholders</td><td> **A**: Head of EU-Rail System Pillar Unit (HoSPU) **R**: SP Core Group (SPC), with Engineering Service team **C**: Architecture and Release Coordination Team (ARCT) **C**: SP Domain Team (SPDT) **C**: IP System Experts (FPSE) **C**: SP Steering Group (SPSG) **(C)**: Working Circle **I**: System and Innovation Programme Board (ED-SIPB) </td></tr><tr><td>Pre-conditions</td><td>•</td></tr><tr><td>Triggers</td><td>• Periodically • Update request of an eligible stakeholder for a plan which has been previously validated</td></tr><tr><td>Frequency</td><td>• Annually</td></tr></table>

		• On demand
	Input	• Standardisation and TSI Input Plan

	Process description	• SPC coordinates overall Standardisation and TSI Input Plan planning across Tasks
		• Per Task ARCT consolidates standardisation proposals from all SPDTs, including external enhancements evaluation, and coordination of architecture design roadmap and releases
		• FPSE consolidate standardisation proposals from FA Innovations and sends it to ARCT for integration. ARCT together with responsible SPDTs decides on integration of FPSE proposals.
		• ARCT analyses and assesses all standardisation proposals and maintains as Standardisation and TSI Input Plan containing
		    o Type
		    o Topic
		    o Date
		    o Responsible SPDT
		    o Proposed standardisation channel (Publication by System Pillar, Standardization, Regulation by TSI)
		    o Proposed grade (Strict specification, Core specification, Market specification, Guideline)
		• SPC consolidates overall Standardisation and TSI Input Plan and reviews proposals (with ERA and DG MOVE) and updates if required
		• [Optional] SPC reviews proposal with Working Circle
		• SPC triggers process
		•

		• Validation of Standardisation and TSI Input Plan (0) • SPC triggers • Publication according to validated Standardisation and TSI Input Plan (0) • SPC triggers Share Standardisation and TSI Input Plan with ERA (16.1.7.1) • SPC triggers Share Standardisation and TSI Input Plan with RASCOP (16.1.8.1)
	Output	• Consolidated Standardisation and TSI Input Plan, ready for validation of SPSG

- Manage technical priorities of Tasks (16.1.2.1) with T1.RSDT and all ARCTs
- SPC updates
  - financial planning
  - schedule
  - organizational structure proposals (SPDTs)
  - work package planning
  - risks & opportunities
- HoSPU presents document and project plan including rational during SPSG meeting
- HoSPU c
- Confirm acceptance of deliverables to SPSG (16.1.5.10) for acceptance of deliverable

Output	• SPSG has validated work plan of SPC for the next project phase

16.1.5.2 Validation of Standardisation and TSI Input Plan

Stakeholders	• **C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Core Group (with ERA representatives) • **A**: SP Steering Group (SPSG) • **C**: SP Domain Teams (SPDTs) • **C**: Innovation Pillar System Experts (FPSEs) • **C**: SP Architecture and Release Coordination Team (ARCT) • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	

Triggers	• Updated Standardisation TSI and Input plan
Frequency	• Annually • On demand in case of update
Input	• Updated Standardisation and TSI Input Plan
Process description	• SPC coordinates Update of Standardisation and TSI Input Plan (16.1.2.1) with ARCT, SPDTs, FPSEs and ERA representatives in SPC • HoSPU distributes updated Standardisation and TSI Input Plan to SPSG members • SPSG members evaluate the Plan • SPSG evaluates way forward on any change request from a member • [Optional] SPC is asked to provide an impact analysis • SPSG decides on update requests • SPSG informs HoSPU and SPC on validation result
Output	• Validated Standardisation and TSI Input Plan

16.1.5.3 Validate change request through SPSG

Stakeholders	• **C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Core Group • **C**: SP Domain Teams (SPDTs) • **A**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	
Triggers	• Change request to architecture element
Frequency	• On demand
Input	• Change request description and evaluation
Process description	• SPC validates that affected SPDTs have analyzed and evaluated Change Request (0), and solution is accepted • SPC formally requests for sector review • HoSPU informs SPSG about Change Request, impact analysis and sector agreement

	• SPSG validates Change Request
Output	• Change request validated by SPSG

16.1.5.4 Confirm acceptance of deliverables to SPSG

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Core Group (SPC) • **A**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Steering Group (SPSG) • **C**: SP Domain Team (SPDT) • **C**: SP Architecture and Release Coordination Team (ARCT) • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	• Standardisation and TSI Input plan validated
Triggers	• A deliverable is ready for acceptance
Frequency	• According to Standardisation and TSI Input plan
Input	• SPDT has elaborated a new document version, ready for acceptance • SPDT has integrated an external document, ready for acceptance
Process description	• SPDT verifies maturity of document (16.1.3.1) • SPDT requests deliverable acceptance from ARCT/SPC and informs about unresolved (technical) conflicts, if applicable • [Optional] SPC involves relevant Working Circle for review and asks SPDT to incorporate any feedback • HoSPU forwards deliverable to SPSG and requests acceptance • SPSG distributes the document to members and requests formal review and acceptance • SPC ensures uptake of review feedback via SPDT and releases new document version for review check of SPSG • SPSG accepts deliverable after final review check
Output	• Deliverable acceptance is confirmed and can be forwarded to output channel

16.1.5.5 Escalation of topic to SP Steering Group

Stakeholders	• **A**: Head of EU-Rail System Pillar Unit (HoSPU)

	• **R**: SP Core Group (SPC) • **C**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (ED-SIPB) • **C**: Working Circle • **I**: SP Steering Group (SPSG)
Pre-conditions	
Triggers	• Conflict that cannot be resolved on working level
Frequency	• On demand
Input	• Issue description, criteria rational and conclusion as prepared during mediation processes
Process description	• Mediation processes are followed up to resolve conflict (16.1.1.1 and 0) • [Optional] SPC involves Working Circle, if not yet done during the mediation process • SPC summarizes position of working circle and HOSPU escalates to SPSG
Output	• SPSG to further process the issue and decide on escalation to Governing Board

16.1.6 System and Innovation Programme Board Interaction

16.1.6.1 Report on program management status of SP

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Core Group (SPC) • **A**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	•
Triggers	• Agenda System and Innovation Programme Board
Frequency	• According to ED-SIPB schedule
Input	• SP status report
Process description	• HoSPU with SPC prepare a status report, on o status, lead, targets, recent activities, achievements, critical topics & mitigations, next steps • HoSPU sends cumulated report 5 days in advance to ED-SIPB meeting • During ED-SIPB HoSPU answers to specific questions of board members

	• ED-SIPB may request additional actions from HoSPU according to the SP remit
Output	• SP status is reported at ED-SIPB

16.1.6.2 Report and verify risks, opportunities and mitigation plans

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Core Group (SPC) • **A**: System and Innovation Programme Board (ED-SIPB) • **(C)**: SP Domain Teams (SPDTs) • **(C)**: SP Architecture and Release Coordination Team (ARCT) • **I**: SP Steering Group (SPSG)
Pre-conditions	•
Triggers	• Agenda System and Innovation Programme Board
Frequency	• Semi-annually
Input	• SP Risk Register
Process description	• SPC update the risk register per defined Task/work package (with ARCT/SPDTs if applicable) • HoSPU perfoms risk meeting, updating status on risks and mitigation actions • HoSPU sends updated risk register to ED-SIPB 5 days in advance to ED-SIPB meeting • HoSPU presents main risks during ED-SIPB, focusing on topics that might affect Innovation Pillar • Mitigation actions that affect the Innovation Pillar are agreed in the ED-SPIB and logged in the risk register
Output	• Risks that affect Innovation Pillar are identified and mitigation actions are defined

16.1.6.3 Escalate program management issues between IP/SP (e.g. resource conflicts)

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Core Group (SPC) • **A**: System and Innovation Programme Board (ED-SIPB) • **C**: FP System Experts (FPSE) • **C**: FA Leader
Pre-conditions	• There is a conflict regarding execution of the committed Programme plan (for technical or strategic conflicts see 16.1.1.1 & 0)
Triggers	• Conflict regarding Programme management is detected
Frequency	• On demand

Input	• SPC and IP
Process description	• SPC prepares an issue description and requests from FPSE a confirmation of the description by the responsible FA Leader • FPSE and FA Leader review and update issue description • Once SPC and FPSE/FA Leader have mutually agreed on the issue description, HoSPU invites for an alignment meeting to define possible solutions • During the alignment meeting possible solutions are identified and the impact to the Programme on SP and IP side are defined • HoSPU/SPC and FA Leader/FPSE mutually agree on the optimum solution of the issue and adjust relevant planning • [Optional] If no mutual decision is possible, the description with possible solution and impacts is forwarded to the ED-SIPB for decision during the next meeting
Output	• Conflict resolved or escalated to ED-SIPB

16.1.6.4 Monitor and support IP alignment with SP strategy

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Core Group (SPC) • **A**: System and Innovation Programme Board (ED-SIPB) • **C**: SP Domain Team (SPDT) • **(C)**: SP Steering Group • **C**: FA Leader • **C**: Innovation Pillar System Experts (FPSE)
Pre-conditions	• CBO released
Triggers	• System and Innovation Programme Board
Frequency	• quarterly
Input	• FA status report
Process description	• FA Leader provides status report of FA activities with issue description to ED-SIPB • ED-SIPB requests an alignment regarding an item in the status report from HoSPU and FA Leader • SPC may request additional information from FPSE of FA • Once SPC and FPSE/FA Leader have mutually agreed on the issue description, HoSPU invites for an alignment meeting to define possible solutions • During the alignment meeting possible solutions are identified and the impacts on the Programme on SP and IP side are defined • [Optional] SPC involves Working Circle for deeper sector involvement

	• [Optional] SPC escalates topic to SPSG (0) for decision • HoSPU reports result in ED-SIPB • SPSG decides on aligned strategy
Output	• Strategy is aligned

16.1.7 European Union Agency for Railways Interaction

Basis for the following sections is the CCM process
(https://www.era.europa.eu/sites/default/files/activities/docs/ertms_ccm_procedure_chapter2_en.pdf)

16.1.7.1 Share Standardisation and TSI Input Plan with ERA

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Core Group (SPC) with ERA representatives • **C**: SP Domain Team (SPDT) • **A**: SP Steering Group (SPSG) • **C**: FP System Experts (FPSE) • **C**: European Union Agency for Railways (ERA) • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	•
Triggers	• Update of the Standardisation and TSI Input Plan
Frequency	• Annually • On-demand
Input	• Standardisation and TSI Input Plan
Process description	• SPC coordinates Update of Standardisation and TSI Input Plan (16.1.2.1) with SPDTs, FPSEs and ERA representatives in SPC *16.1.7.2 SPC requests Validate System Pillar work plan by SPSG* | Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Core Group (SPC) • **A**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (ED-SIPB) • **I**: SP Domain Teams • **C**: Task 1 Railway System Domain Team (T1.RSDT)	

		• **C**: SP Architecture and Release Coordination Team (ARCT)
	Pre-conditions	• Released 5 years planning document
	Triggers	• SPC project planning requires new mandate
	Frequency	• After tender process • Annual update
	Input	• Call text • 5 years planning document

	Process description	• SPC creates or updates project planning document for next project phase, according to
		    o 5 years planning
		    o Updated Standardisation and TSI Input Plan
		    o Resource and budget constraints
		    o Call text
		• SPC follows Update of Standardisation and TSI Input Plan

Stakeholders	• **A**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Core Group (SPC), with Engineering Service team • **C**: Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (FPSE) • **C**: SP Steering Group (SPSG) • **(C)**: Working Circle • **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	•

			Triggers	• Periodically • Update request of an eligible stakeholder for a plan which has been previously validated
			Frequency	• Annually • On demand
			Input	• Standardisation and TSI Input Plan

			Process description	• SPC coordinates overall Standardisation and TSI Input Plan planning across Tasks
				• Per Task ARCT consolidates standardisation proposals from all SPDTs, including external enhancements evaluation, and coordination of architecture design roadmap and releases
				• FPSE consolidate standardisation proposals from FA Innovations and sends it to ARCT for integration. ARCT together with responsible SPDTs decides on integration of FPSE proposals.
				• ARCT analyses and assesses all standardisation proposals and maintains as Standardisation and TSI Input Plan containing
				    o Type
				    o Topic
				    o Date

			○ Responsible SPDT ○ Proposed standardisation channel (Publication by System Pillar, Standardization, Regulation by TSI) ○ Proposed grade (Strict specification, Core specification, Market specification, Guideline) - SPC consolidates overall Standardisation and TSI Input Plan and reviews proposals (with ERA and DG MOVE) and updates if required [Optional] SPC reviews proposal with Working Circle - SPC triggers process - Validation of Standardisation and TSI Input Plan (0) - SPC triggers - Publication according to validated Standardisation and TSI Input Plan (0) - SPC triggers Share Standardisation and TSI Input Plan with ERA (16.1.7.1) - SPC triggers Share Standardisation and TSI

			Input Plan with RASCOP (16.1.8.1)
		Output	• Consolidated Standardisation and TSI Input Plan, ready for validation of SPSG

• Manage technical priorities of Tasks (16.1.2.1) with T1.RSDT and all ARCTs
• SPC updates
    o financial planning
    o schedule
    o organizational structure proposals (SPDTs)
    o work package planning
    o risks & opportunities
• HoSPU presents document and project plan including rational during SPSG meeting
• HoSPU c
• Confirm acceptance of deliverables to SPSG (16.1.5.10) for acceptance of deliverable

Output	• SPSG has validated work plan of SPC for the next project phase

• Validation of Standardisation and TSI Input Plan
•
• Validation of Standardisation and TSI Input Plan (0) through SPSG
• SPC shares Standardisation and TSI Input plan formally with ERA
• ERA updates workload planning according to documents proposed for TSI as channel

Output	• Aligned planning between Standardisation and TSI Input plan and ERA aligned workload plan

16.1.7.3 Validate and Assess Change Request (Enhancement or Error Correction)

Stakeholders	• I: Head of EU-Rail System Pillar Unit (HoSPU) • I: SP Core Group • **C**: SP Domain Teams (SPDT) • **A/R**: European Union Agency for Railways (ERA)
Pre-conditions	The CR is in the scope of the JU
Triggers	• A CR is proposed from JU (SP or IP) work and the SP submits a corresponding (error or enhancement) CR issue description including rationale
Frequency	• Periodic validation within ERA
Input	• Description on the change requested as defined in the CCM process STEP 10. The rationale of the CR shall be given, whether the CR relates to either the need for debugging the specified baseline or to the need for functional or performances improvement.
Process description	See CCM process, sections 2.3.3.1. – 2.3.3.4. The involved SPDTs are involved in the validation of the CR as authors / experts.
Output	Valid or invalid CR in the ERA CCM database including a CR number for unambiguous identification.

16.1.7.4 Prepare, validate, and solve Enhancement Change Request of JU

Stakeholders	• **I**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Core Group • **R**: SP Domain Teams (SPDTs) • **I**: European Union Agency for Railways (ERA) • **C**: FP System Experts (FPSE) • **C**: UNISIG Super Group • **C**: EUG System Group
Pre-conditions	• A possible enhancement is in the scope of JU. • The Standardisation and TSI Input Plan defines an enhancement to the TSI and the expected timeline for delivery.
Triggers	

Frequency	• Drafting and submitting an enhancement CR according to the Standardisation and TSI Input Plan • Drafting and submitting a cover CR for a new document according to the Standardisation and TSI Input Plan • Preparation of the enhancement CR solution according to the Standardisation and TSI Input Plan
Input	• The SP proposes a draft problem description with a clear technical, operational and economical rational according to the CCM process • A draft document is available which has been prepared by SPDTs (with FPSE)

Process description	• SPDTs (with FPSE) for drafting an enhancement CR:
	    ○ checks if the draft problem description fulfils the validation criteria of the ERA CCM process STEP 30
	    ○ checks if it is really an enhancement according to the ERA CCM process STEP50&51
	    ○ reviews and agrees on the content of the CR.
	    ○ achieves a common view on a possible solution proposal.
	    ○ optionally a solution proposal has been agreed already in the SPDTs before posting the CR.
	
	• SPDTs (with FPSE) for drafting a Cover CR for a new document:
	    ○ drafts a Cover CR for the new document with a clear technical, operational or economical rational
	    ○ reviews and agrees on the content of the cover CR.
	    ○ optionally the document has been agreed already in the SPDTs before posting the cover CR.
	    ○ optionally, if possible a document draft should have been reviewed and agreed already in the ERA Topical Working Group on Architecture before posting the cover CR.
	
	• SPDTs (with FPSE) for solving an enhancement CR / a document cover CR:
	    ○ A sub-group shall work out a solution for the CR.
	    ○ The solution is agreed by the corresponding experts of SPDTs including the UNISIG Supergroup and the EUG System Group.

	- In case of non-agreement in the SPDTs (with FPSE) the topic is escalated to the SP Core Group for a decision who may involve other SPDTs in its decision process. - In case of new documents, the SP Core Group needs to agree on the cover CR. - Once approved by the SP Core Group, the resolution of the enhancement CR will be sent to ERA.
Output	- SP has taken a decision for an enhancement / cover CR to submit it or not. - The enhancement / cover CR is submitted by SPDT or a SP Core Group member to the ERA CCM database. - The CR solution is submitted by SPDT or a SP Core Group member to the ERA CCM database.

16.1.7.5 Prepare, validate, and solve Enhancement Change Request external from JU

Stakeholders	- **I**: Head of EU-Rail System Pillar Unit (HoSPU) - **C**: SP Core Group - **C**: SP Domain Teams (SPDTs) - **C**: SP Architecture and Release Coordination Team (ARTC) - **A/R**: European Union Agency for Railways (ERA) - **C**: SP Steering Group (SPSG) - **(C)**: FP System Experts (FPSE)
Pre-conditions	A possible enhancement is in the scope of [DAC, TAP/TAF, CCS, TMS]
Triggers	ERA has evaluated a CR from outside of the JU
Frequency	- On demand
Input	- CR

Process description	- A CR from outside of the JU has been submitted to ERA
	- ERA evaluates CR as an enhancement
	- ERA requests from SPC to carry out a formalized pre-assessment of the CR
	    o Quality: whether the CR has a clear objective, detailed scope (content table of the changes to the subsets), clear transition framework, economic assessment, consideration of technical maturity,
	    o System impact: check CR impact to SP architecture, and operational concept and CBOs
	    o Planning and project of delivery

	• SPC with ARCT carry out quality pre-assessment
	• ERA confirms (or not) quality assessment
	    ○ If quality is insufficient, the submitting party is requested to redevelop
	• If quality is sufficient, system impact check carried out
	    ○ SPC assigns with ARCT responsibility for analysis to SPDTs
	    ○ SPDTs analyze CR and ensures alignment with SP architecture
	• ERA verifies output of impact check
	• SPSG validates overall pre-assessment
	• Pre-assessment formally handed over to ERA
	• [then final specification development ERA led (made by SPDTs, with FPSE, other), but focused on the agreed scope (not reopening scope discussions)]

Output	• CR checked and in line with architecture

16.1.7.6 Support Specification Error Correction Change Request

Stakeholders	• **I**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Core Group • **R**: SP Domain Teams (SPDT) • **I**: European Union Agency for Railways (ERA) • **C**: UNISIG Super Group • **C**: EUG System Group
Pre-conditions	A possible specification error is in the scope of ERTMS/ETCS/CCS/TMS (concerned document(s) of the TSI CCS/OPE annex A)
Triggers	• A possible specification error has been detected • ERA involves the SP in the resolution of a specification error CR if required
Frequency	• On demand; a member sees the need for an error CR • On demand; ERA involves the SP in the resolution of a specification error CR
Input	• The SPDT proposes a draft issue description with a clear economic, technical or operational rational. • Agreed specification error CR issue description by ERA which is assigned to the SP
Process description	• The SPDT responsible for drafting a specification error CR:

	- checks if the draft issue description fulfils the validation criteria of the ERA CCM process STEP 30 - checks if it is really an error according to the ERA CCM process STEP50&51 - reviews and agrees on the content of the CR - optionally achieves a common view on a possible solution proposal - The SPDTs for resolution of a specification error CR: - A sub-group shall work out a solution for the CR - The solution is agreed by the corresponding experts including the UNISIG Supergroup and the EUG System Group - In case of non-agreement in the SPDT, the topic is escalated to the SP Core Group for a decision who may involve further SPDTs in its decision process
Output	- SP has taken a decision for a specification error CR. - The CR is submitted by a SP Core Group member to the ERA CCM database.

16.1.7.7 Request Input from Topical Working Group

Stakeholders	**I**: Head of EU-Rail System Pillar Unit (HoSPU) **R**: SP Core Group (SPC) **C**: SP Domain Team (SPDT) **C**: FP System Experts (FPSE) **A**: European Union Agency for Railways (ERA) **C**: Topical Working Group (TWG)
Pre-conditions	ERA has set up a Topical Working Group and relevant experts have been selected and remit is defined
Triggers	The TWG has identified that the SP might contribute to the solution
Frequency	On demand of the TWG
Input	TWG scope definition of specification of the required Input
Process description	- ERA contacts SPC, submitting the scope of the TWG, informs about involved experts, and defines specific input scope that is requested - SPC identifies with ARCT the relevant SPDT(s) and FPSE that are required to deliver the input - SPC nominates one SPDT to lead the coordination - Lead SPDT is integrated into TWG and provides support by

	- o Coordinating with FPSE and other SPDTs any input requested - o Impact assessment for SP architecture and specification - o Support of defining technical solution with the experts in the TWG
Output	- SPDT is integrated in TWG and provides requested support

16.1.8 International and European Standardisation Organisations Interaction

16.1.8.1 Share Standardisation and TSI Input Plan with RASCOP

Stakeholders	- **A**: Head of EU-Rail System Pillar Unit (HoSPU) - **R**: SP Core Group (SPC) - **C**: SP Domain Team (SPDT) - **C**: IP System Experts (FPSE) - **C**: Rail Standardisation Coordination Platform for Europe (RASCOP) - **I**: System and Innovation Programme Board (ED-SIPB)
Pre-conditions	-
Triggers	- Update of the Standardisation and TSI Input Plan
Frequency	- Annually - On-demand
Input	- Standardisation and TSI Input Plan
Process description	- SPC prepares Update of Standardisation and TSI Input Plan (16.1.2.1) with SPDTs, FPSEs and ERA representatives in SPC - SPC requests - - Validation of Standardisation and TSI Input Plan (0) through SPSG - HoSPU shares Standardisation and TSI Input plan formally with RASCOP - RASCOP updates planning according to documents proposed for Standardisation as channel
Output	- Aligned planning between Standardisation and TSI Input plan and RASCOP Workload plan