Governance organisation and working arrangement of the System Pillar: Annexes

Disclaimer: The information contained in the Annexes is for information and to support the understanding of the main document. The content should not be treated as definitive.

Annex A: Working Circles

Contents

1 Purpose

The purpose of this document is to introduce the setup and structure of the System Pillar Working Circles. These working circles are designed as additional forum to ensure early sector alignment as basis for decision making as defined in the System Pillar Governance main document.

2 Working Circles

The SPC defines dedicated working circles with representatives from the sector to ensure alignment between working teams and with sector representatives. The circles do not have a formal role in the governance and decision process of the System Pillar, but are instantiated for specific topics or conflicts that require aligned sector preparation of a decision. Currently, the following meeting circles are intended:

- Architecture Circle
- Strategy Circle
- Operational harmonization Circle

Further details on the working arrangements of these circles are given in the section below

2.1 Working Circles and sector alignment

The Working Circles in the System Pillar are established to achieve broad sector alignment early in the system design process. The target of these working circles is to resolve any issues before a decision is forwarded to the System Pillar Steering Group. The Working Circles targets to include the adequate level of experts to the relevant topic as representatives to their sector organization already during the drafting phase of a document (rather than an involvement at the later review cycles). The Working Circles are organized to guide the system design process top-down, from definition and alignment of Common Business Objectives as strategically agreed basis, to derived harmonized Operational Concepts, to derived architectural decisions. Thus currently, the following Working Circles are intended:

- Strategy Circle
- Operational harmonization Circles:
  - CONOPS: Concept of operations, business, legal, commercial, and organisational view
  - CONUSE: Concept how to use the system, production view
  - CONEMP: Concept of employment, provide system and resources, “asset management view”
- Architecture Circle

The principle process to ensure sector alignment during the system design process is designed as follows:

a. The sector agrees at the level of the SPG on a set of Common Business Objectives as root for all decisions required to mediate a conflict. Strategic decisions are prepared by the Strategy Circle on the basis of the Common Business Objectives and endorsed via the SP Steering Group.
b. A harmonized Operational Process is derived from the Common Business Objectives and detailed by the Operational Harmonization Circles. The Operational Process includes process improvements that the target architecture shall support. These improvements have to fulfill Common Business Objectives. In case an improvement is justified with conflicting/competing

Business Objectives the *Mediation Process to Ensure Sector Alignment (Annex B*) is followed to decide on the improvement and its granularity.

c. The System Architecture is derived from the Operational Process description and discussed by the Architecture Circle, which is based on the CBO. The System Architecture must allow implementation of process improvements of the harmonized Operational Process. Logical and functional aspects of the system architecture shall be designed in order to fulfill the Operational Process and its improvements. For design aspects where a mutual agreement between Domain Leads cannot be reached, the *Mediation Process to Decide on Granularity) (Annex B)*is followed.

2.1.1 Strategy Circle

- Chair: System Pillar Core Group member
- Members: System Pillar Core Group, sector representativces (e.g. UNIFE/UNISIG/UNITEL representatives, EIM/CER/EUG/UIC representatives, …), ERA , selected IPSE
- Responsibilities
    - Input to decision proposal based on agreed Common Business Objectives (e.g. prepare decision to instantiate new domain)
    - Input to decision proposals in case of conflicts to SPSG

2.1.2 Operational Harmonization Circle: CONOPS

- Chair: System Pillar Core Group member
- Members: Operational Harmonization Domain Team, System Pillar Core Group, sector representativces (e.g. UNIFE/UNISIG/UNITEL representatives, EIM/CER/EUG/UIC representatives, …), ERA , selected IPSE
- Responsibilities
    - Align proposal for and agreed harmonized Concept of Operation regarding strategic topics, such as operations, business, legal, commercial, and organisational view
    - Integration of CONUSE, CONEMP
    - Prepare validation of Operational Concepts via SPSG
    - Prepare decision proposals to SPSG

2.1.2.1 [Operational Harmonization Circle: CONUSE]

- Chair: Operational Harmonization Domain Team
- Members:, selected IPSE
- Responsibilities
    - Align proposal for agreed harmonized Concept of Operation regarding usage of the system
    - Prepare validation of CONUSE via CONOPS Operational Harmonization Circle

2.1.2.2 [Operational Harmonization Circle: CONEMP]

- Chair: Operational Harmonization Domain Team / Cross-cutting Domain Team

- Members: System Pillar Core Group, sector representativces (e.g. UNIFE/UNISIG/UNITEL representatives, EIM/CER/EUG/UIC representatives, …), ERA , selected IPSE
- Responsibilities
    - Align proposal for agreed harmonized Concept of Operation regarding employment (construction & maintenance) of the system
    - Prepare validation of CONEMP via CONOPS Operational Harmonization Circle

2.1.3 Architecture Circle

- Chair: System Pillar Core Group
- Members: System Pillar Core Group, The SP Architecture and Release Coordination Team, , sector representativces (e.g. UNIFE/UNISIG/UNITEL representatives, EIM/CER/EUG/UIC representatives, …), ERA , Specific Domain Teams on demand, selected IPSE
- Responsibilities
    - Whole-system design of functional architecture, allocation of functionality
    - Ensure consistency of system architecture in alginment with specific Domain Teams
    - Prepare decision proposals regarding architecture to SPSG

Annex B: Procedure descriptions

Contents

1 Purpose

The purpose of this document is to specify the procedure descriptions between the different organizational units of the System Pillar, based on the responsibilities defined in the main document of the Governance organisation. The document thus details sector organization involvement in the System Pillar activities, as well as involvement of the Innovation Pillar in the system design process. The information in the final version of this document will be an input to the ERJU Governance Handbook as a single reference for the governance of the JU. As such processes may be adapted based on the decision-making process to finalise the ERJU Governance Handbook.

2 Open Points

- Rules for Standardization and TSI Input plan population (e.g. regarding output channel and grade selection) are out of scope of this document
- 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 document stops at the level of the System Pillar Steering Group. The final validation and decision step between System Pillar Steering Group and 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).

3 Overview and RACI Matrix

			Stakeholders														
Chapter	Procedure Title	Head of EU-Rail System Pillar Unit (HoSPU)	SP Coregroup (SPC)	SP Domain Team (SPDT)	SP Architecture and Release Coordination Team (ARCT)	Task 1 Railway System Domain Team (T1.RSDT)	Task 2..n Operational Design Domain Team (ODDT)	SP PRAMSS Management & Assurance Team (PMAT)	SP Migration & Roadmap Team (MRT)	Working Circle (WCs)	IP System Experts (IPSE)	IP / FA Leader	System and Innovation Programme Board (SIPB)	SP Steering Group (SPSG)	European Union Agency for Railways (ERA)	Rail Standardisation Coordination Platform for Europe (RASCOP)
4	Procedure descriptions															
4.1	System Pillar Mediation process															
4.1.1	Mediation Process to Ensure Sector Alignment	I/C	R	C						(C)	C		I	A		
4.1.2	Mediation Process to decide on the need for an interface specification	I/C	R	C						(C)	C		I	A		
4.2	System Pillar Planning															
4.2.1	Update of Standardisation and TSI Input Plan	A	R	C	C					(C)	C		I	C		
4.2.2	Manage technical priorities of Tasks	I/C	R	C	C						(C)		I	A		
4.2.3	Define and assign external design activity	I/C	R/A	C	C											
4.3	System Pillar System Design															
4.3.1	Verify input document through Domain team	I/C	R/A	C	C											
4.3.2	Evaluate level of impact	I/C	A	C	R						(C)		I	I		
4.3.3	Define Harmonized Operation Processes	I/C	A			R/C	R									
4.3.4	Process requirement allocation (functional, non-functional and PRAMSS)	I/C	I	C	R/A	C		C	C							
4.3.5	Preparation of Task output	I/C	A	R			C	C	C							
4.3.6	Publication according to validated Standardization and TSI Input Plan	I/C	R/A	C	C								I	I		
4.4	Innovation Pillar Interaction															
4.4.1	Release new or updated architecture building block specification from SP to IP (FIS)	I/C	A	C	R					(C)	C		I	I		
4.4.2	Align on updated architecture element from SP	I/C	I/(C)	C	A/R					(C)	C		I	I		
4.4.3	Change Request to architecture element from IP to SP	I/C	I/(C)	C	A/R					(C)	C		I	I		
4.4.4	Alignment process between two FAs via SP	I/C	I	C	A						R		I	I		
4.4.5	Propose specification element from IP to SP for acceptance	I/C	A/C	C	R						C		I	I		
4.5	System Pillar Steering Group Interaction															
4.5.1	Validate System Pillar work plan by SPSG	R	C	I	C	C							I	A		
4.5.2	Validation of Standardization and TSI Input Plan	C	R	C	C						C		I	A	C	
4.5.3	Validate change request through SPSG	C	R	C									I	A		
4.5.4	Confirm acceptance of deliverables to SPSG	A	R	C									I	C		
4.5.5	Escalation of topic to SP Steering Group	A	R							C			I	C		
4.6	System and Innovation Programme Board Interaction															
4.6.1	Report on program management status of SP	R	C										A			
4.6.2	Report and verify risks, opportunities and mitigation plans	R	C	(C)	(C)								A	I		
4.6.3	Escalate program management issues between IP/SP (e.g. resource conflicts)	R	C								C	C	A			
4.6.4	Monitor and support IP alignment with SP strategy	R	C	C							C	C	A			
4.7	European Union Agency for Railways Interaction															
4.7.1	Share Standardization and TSI Input Plan with ERA	I/C	R	C							C		I	A	C	
4.7.2	Validate and Assess Change Request (Enhancement or Error Correction)	I	C											I	A/R	
4.7.3	Prepare, validate, and solve Enhancement Change Request of JU	I	A	R							C				I	
4.7.4	Prepare, validate, and solve Enhancement Change Request external from JU	I	C	C	C						(C)			C	A/R	
4.7.5	Support Specification Error Correction Change Request	I	A	R											I	
4.7.6	Request Input from Topical Working Group	I	R	C							C				A/R	
4.8	International and European Standardization Organisations Interaction															
4.8.1	Share Standardization and TSI Input Plan with RASCOP	A	R	C							C		I	A		C

Note: The overview given in the RACI matrix is limited to the main organizational units of the System Pillar, single procedure descriptions below are partially be more comprehensive.

Four types of roles are defined:

- Responsible: “R”: Refers to the person who must ensure that activities are completed successfully. In a RACI chart, answers the question: **Who is getting the task done?** Roles taking the main operational stake in fulfilling the activity listed and creating the intended outcome.
- Accountable: “A”: The individual, group or entity that is ultimately responsible for a subject matter, process or scope. In a RACI chart, answers the question: **Who accounts for the success of the task?**
- Consulted: “C”: Refers to those people whose opinions are sought on an activity (two-way communication). In a RACI chart, answers the question: **Who is providing input?** Key roles that provide input. Note that it is up to the accountable and responsible roles to obtain information from other units or external partners, too; however, inputs from the roles listed 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 people who are kept up to date on the progress of an activity (one-way communication). In a RACI chart, answers the question: **Who is receiving information?** Roles who are informed of the achievements and/or deliverables of the task. The role in ‘accountable, of course, should always receive appropriate information to oversee the task, as do the responsible roles for their area of interest.

4 Procedure descriptions

The procedure desciptions in this section are supporting the formal decision process between the different bodies of the governance organisation. They are indicative and shall serve as principle guidelines for the organisational units. The reponsibles for each process as defined in the relevant desciptions below have to organize the work accordingly. The process desciptions are subject to change during System Pillar lifetime, where deemed necessary. Changes to this document 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.

4.1 System Pillar Mediation process

4.1.1 Mediation Process to Ensure Sector Alignment

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R:** SP Coregroup (SPC) • **C:** SP Domain Team (SPDT) • **C:** IP System Experts (IPSE) • **A:** SP Steering Group (SPSG) • **(C):** Working Circle (WCs) • **I:** System and Innovation Programme Board (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 • 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 IPSE, 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 4.5.5 (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

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

Note: The definition of the Standardization and TSI Input Plan is described in a dedicated process to decide on general standardization 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 Coregroup (SPC) • **C:** SP Domain Team (SPDT) • **C:** IP System Experts (IPSE) • **A:** SP Steering Group (SPSG) • **(C):** Working Circle (WCs) • **I:** System and Innovation Programme Board (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 • IPSE 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.:
	  ○ Architecture Splitting rule
	  ○ Operational Process improvement
	  ○ Common Business Objectives

	• The SPC decides on the relevant criteria for the issue • The SPC requests from the stakeholders (e.g. SPDT, or IPSE) 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 4.5.5 (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

4.2 System Pillar Planning

4.2.1 Update of Standardisation and TSI Input Plan

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

Process description	• SPC coordinates overall Standardization and TSI Input Plan planning across Tasks
	• Per Task ARCT consolidates standardization proposals from all SPDTs, including external enhancements evaluation, and coordination of architecture design roadmap and releases
	• IPSE consolidate standardization proposals from FA Innovations and sends it to ARCT for integration. ARCT together with responsible SPDTs decides on integration of IPSE proposals.
	• ARCT analyses and assesses all standardization proposals and maintains as Standardization and TSI Input Plan containing
	  ○ Type
	  ○ Topic
	  ○ Date
	  ○ Responsible SPDT
	  ○ Proposed standardization channel (Publication by System Pillar, Standardization, Regulation by TSI)

	○ Proposed grade (Strict specification, Core specification, Market specification, Guideline) • SPC consolidates overall Standardization 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 Standardization and TSI Input Plan (4.5.2) • SPC triggers Publication according to validated Standardization and TSI Input Plan (4.3.6) • SPC triggers Share Standardization and TSI Input Plan with ERA (4.7.1) • SPC triggers Share Standardization and TSI Input Plan with RASCOP (4.8.1)
Output	• Consolidated Standardization and TSI Input Plan, ready for validation of SPSG

4.2.2 Manage technical priorities of Tasks

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (SPC) • **C**: SP Domain Team (SPDT) • **C**: SP Architecture and Release Coordination Team (ARCT) • **(C)**: IP System Experts (IPSE) • **A**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (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 Standardization 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 Standardization 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 IPSE) • 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 annual work plan • SPC requests validation via SPSG

Output	• Updated and validated work plan

4.2.3 Define and assign external design activity

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R/A**: SP Coregroup (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 Standardization and TSI Input Plan • External body prepares specification element and delivers to SPC • SPC follows Verify input document through Domain team (4.3.1) • SPDT with ARCT integrates specification and aligns SP architecture
Output	• Specification element prepared by external body is fully integrated into SP architecture

4.3 System Pillar System Design

4.3.1 Verify input document through Domain team

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R/A**: SP Coregroup (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 (economical, 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

4.3.2 Evaluate level of impact

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

4.3.3 Define Harmonized Operational Processes

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Coregroup (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 Standardization and TSI Input Plan
Frequency	• On demand
Input	• Validated Standardization 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 (Organisational 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 (4.5.1) • 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 according to Manage technical priorities of Tasks (4.2.2) • ODDT follows per process to be harmonized and improved a re-design process • ODDTT requests per Operational Process description Preparation of Task output (4.3.5)
Output	• Harmonized Operational Process description ready for breakdown in architecture

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

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I**: SP Coregroup (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

4.3.5 Preparation of Task output

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Coregroup (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 organisations 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

4.3.6 Publication according to validated Standardization and TSI Input Plan

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R/A**: SP Coregroup (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 (SIPB)
Pre-conditions	• SPSG validated Standardization and TSI Input Plan
Triggers	• Periodical monthly publication cycle
Frequency	• Monthly
Input	• Updated documents as defined and validated in Standardization and TSI Input Plan

Process description	• SPC with Programme Office receives updated documents of SPDTs, according to Standardization 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' on 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 public Internet

4.4 Innovation Pillar Interaction

4.4.1 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 Coregroup • **R**: SP Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (IPSE) • **(C)**: Working Circle • **I**: SP Steering Group • **I**: System and Innovation Programme Board (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 Standardization 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 • IPSE verifies specification and may request clarifications from SPDT responsible • IPSE prepares a coverage matrix, allocating specified requirements to demonstrators to see coverage of item in FA • [Mandatory only if part of call contract] IPSE 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] Instantiate Working Circle with IPSE/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 • [Mandatory only if part of call contract] Acceptance plan with timing to deliver FFFiS

4.4.2 Align on updated architecture element from SP

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I/(C)**: SP Coregroup • **A/R**: SP Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (IPSE) • **(C)**: Working Circle • **I**: SP Steering Group • **I**: System and Innovation Programme Board (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 (4.3.2 Evaluate level of impact) • [Optional] 'Validate change request via SP Steering Group 4.5.3' • ARCT initiates request by sharing the document with IP System Experts • IPSE 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] Instantiate Working Circle g with IPSE/ARCT/SPDT to find compromise Escalation of topic to SP Steering Group if needed (4.5.5)
Output	• Agreement/Disagreement to start working on architecture element

4.4.3 Change Request to architecture element from IP to SP

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I/(C)**: SP Coregroup • **A/R**: SP Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (IPSE) • **(C)**: Working Circle • **I**: SP Steering Group • **I**: System and Innovation Programme Board (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	• IPSE may launch this process on a bi-monthly basis.
Input	• Description on the change requested, with technical, operational or economical rational

Process description	• IPSE 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 IPSE
	• SPDT executes impact analysis (technical, operational or economical) to evaluates 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 (4.3.2)
	• [Optional] Validate change request through SPSG (4.5.3)
	• SPC and ARCT send response to IPSE with evaluation and acceptance result, if positive SPDT executes changes to architecture element, if negative
	  ○ [Optional] Instantiate Working Circle to find compromise
	  ○ Escalation of topic to SP Steering Group if needed (4.5.5)

Output	• Updated architecture if change request accepted

4.4.4 Alignment process between two FAs via SP

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **I**: SP Coregroup • **A**: SP Architecture and Release Coordination Team (ARCT) • **C**: System Pillar Domain Team (SPDT) • **R**: IP System Experts (IPSE) • **I**: SP Steering Group • **I**: System and Innovation Programme Board (SIPB)
Pre-conditions	• IPSEs 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	• IPSE 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 IPSE • SPDT evaluates request and decides based on principles described in 4.1.1 • SPDT communicates to IPSE decision • IPSE ensure uptake in respective architecture artefact
Output	• Specification element submitted Output process (ERA for TSI, standardization or publication)

4.4.5 Propose specification element from IP to SP for acceptance

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **A/C**: SP Coregroup • **R**: SP Architecture and Release Coordination Team (ARCT) • **C**: System Pillar Domain Team (SPDT) • **C**: IP System Experts (IPSE) • **I**: SP Steering Group • **I**: System and Innovation Programme Board (SIPB)
Pre-conditions	• Flagship Area project is responsible for delivering specification element
Triggers	• IPSE provides a new or updated version of a specification element (e.g. FFFIS, model, data requirements, …), ready for submission to ERA CCM or standardization process
Frequency	• IPSE launches this process on demand
Input	• Specification elements ready for submission
Process description	• IPSE 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 IPSE • SPDT verifies specification against requirements (FiS specification, economic, operational, migration, others, …)

	• ARCT may request changes to specification from IP if requirement criteria are not fulfilled, otherwise document is accepted • ARCT forward to SPC to follow 'Confirm acceptance of deliverables to SPSG' (4.5.4)
Output	• Specification element ready for submission to output channel according to Standardization and TSI Input plan

4.5 System Pillar Steering Group Interaction

4.5.1 Validate System Pillar work plan by SPSG

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Coregroup (SPC) • **A**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (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 Standardization and TSI Input Plan
	  ○ Resource and budget constraints
	  ○ Call text
	• SPC follows Update of Standardisation and TSI Input Plan

Stakeholders	• **A**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (SPC), with Engineering Service team • **C**: Architecture and Release Coordination Team (ARCT) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (IPSE) • **C**: SP Steering Group (SPSG) • **(C)**: Working Circle • **I**: System and Innovation Programme Board (SIPB)
Pre-conditions	•

Triggers	• Periodically • Update request of an eligible stakeholder for a plan which has been previously validated
Frequency	• Annually • On demand
Input	• Standardization and TSI Input Plan

Process description	• SPC coordinates overall Standardization and TSI Input Plan planning across Tasks
	• Per Task ARCT consolidates standardization proposals from all SPDTs, including external enhancements evaluation, and coordination of architecture design roadmap and releases
	• IPSE consolidate standardization proposals from FA Innovations and sends it to ARCT for integration. ARCT together with responsible SPDTs decides on integration of IPSE proposals.
	• ARCT analyses and assesses all standardization proposals and maintains as Standardization and TSI Input Plan containing
	  ○ Type
	  ○ Topic
	  ○ Date
	  ○ Responsible SPDT
	  ○ Proposed standardization channel (Publication by System Pillar, Standardization, Regulation by TSI)
	  ○ Proposed grade (Strict specification, Core specification, Market specification, Guideline)
	• SPC consolidates overall Standardization 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 Standardization and TSI Input Plan (4.5.2)
	• SPC triggers Publication according to validated Standardization and TSI Input Plan (4.3.6)
	• SPC triggers Share Standardization and TSI Input Plan with ERA (4.7.1)

	• SPC triggers Share Standardization and TSI Input Plan with RASCOP (4.8.1)
Output	• Consolidated Standardization and TSI Input Plan, ready for validation of SPSG

- Manage technical priorities of Tasks (4.2.1) with T1.RSDT and all ARCTs
- SPC updates
  - financial planning
  - schedule
  - organizational structure proposals (SPDTs)
  - work package planning
  - Risk & Opportunities
- HoSPU presents document and project plan including rational during SPSG meeting
- HoSPU follows Confirm acceptance of deliverables to SPSG (4.5.14.5.4) for acceptance of deliverable

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

4.5.2 Validation of Standardization and TSI Input Plan

Stakeholders	• **C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (with ERA reresentatives) • **A**: SP Steering Group (SPSG) • **C**: SP Domain Teams (SPDTs) • **C**: Innovation Pillar System Experts (IPSEs) • **C**: SP Architecture and Release Coordination Team (ARCT) • **I**: System and Innovation Programme Board (SIPB)
Pre-conditions	
Triggers	• Updated Standardization TSI and Input plan
Frequency	• Annually • On demand in case of update
Input	• Updated Standardization and TSI Input Plan
Process description	• SPC coordinates Update of Standardisation and TSI Input Plan (4.2.1) with ARCT, SPDTs, IPSEs and ERA representatives in SPC • HoSPU distributes updated Standardization and TSI Input Plan to SPSG members • SPSG members evaluate 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 Standardization and TSI Input Plan

4.5.3 Validate change request through SPSG

Stakeholders	• **C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup • **C**: SP Domain Teams (SPDTs) • **A**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (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 (4.4.2), 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

4.5.4 Confirm acceptance of deliverables to SPSG

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (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 (SIPB)
Pre-conditions	• Standardization and TSI Input plan validated
Triggers	• A deliverable is ready for acceptance
Frequency	• According to Standardization 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 (4.3.1) and

	• 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 distributed document to members and requests formal review and acceptance • SPC ensures uptake of review feedback via SPDT and releases new documents 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

4.5.5 Escalation of topic to SP Steering Group

Stakeholders	• **A**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (SPC) • **C**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (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 to resolve conflict (4.1.1 and 4.1.2) • [Optional] SPC involves Working Circle, if not yet done during 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

4.6 System and Innovation Programme Board Interaction

4.6.1 Report on program management status of SP

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Coregroup (SPC) • **A**: System and Innovation Programme Board (SIPB)
Pre-conditions	•
Triggers	• Agenda System and Innovation Programme Board
Frequency	• According to SIPB schedule

Input	• SP status report
Process description	• HoSPU with SPC prepare a status report, on ○ Status, Lead, Targets, Recent activities, achievements, critical topics & mitigations, Next steps • HoSPU sends cumulated report 5 days in advance to SIPB meeting • During SIPB HoSPU answers to specific questions of board members • SIPB may request additional actions from HoSPU according to the SP remit
Output	• SP status is reported at SIPB

4.6.2 Report and verify risks, opportunities and mitigation plans

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Coregroup (SPC) • **A**: System and Innovation Programme Board (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 SIPB 5 days in advance to SIPB meeting • HoSPU presents main risks during SIPB, focusing on topics that might affect Innovation Pillar • Mitigation actions that affect the Innovation Pillar are agreed in the SPIB and logged in the risk register
Output	• Risks that affect Innovation Pillar are identified and mitigation actions are defined

4.6.3 Escalate program management issues between IP/SP (e.g. resource conflicts)

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Coregroup (SPC) • **A**: System and Innovation Programme Board (SIPB) • **C**: Innovation Pillar System Experts (IPSE) • **C**: FA Leader
Pre-conditions	• There is a conflict regarding execution of the committed programme plan (for technical or strategic conflicts see 4.1.1 & 4.1.2)
Triggers	• Conflict regarding programme management is detected
Frequency	• On demand

Input	• SPC and IP
Process description	• SPC prepares an issue description and requests from IPSE a confirmation of the description by the responsible FA Leader • IPSE and FA Leader review and update issue description • Once SPC and IPSE/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/IPSE 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 SIPB for decision during the next meeting
Output	• Conflict resolved or escalated to SIPB

4.6.4 Monitor and support IP alignment with SP strategy

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Coregroup (SPC) • **A**: System and Innovation Programme Board (SIPB) • **C**: SP Domain Team (SPDT) • **(C)**: SP Steering Group • **C**: FA Leader • **C**: Innovation Pillar System Experts (IPSE)
Pre-conditions	• CBO released
Triggers	• System and Innovation Programme Board
Frequency	• quarterly
Input	• FA status report
Process description	• FA leader provide status report of FA activities with issue description to SIPB • SIPB requests an alignment regarding an item in the status report from HoSPU and FA Leader • SPC may request additional information from IPSE of FA • Once SPC and IPSE/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 • [Optional] SPC involves Working Circle for deeper sector involvement • [Optional] SPC escalates topic to SPSG (4.5.5) for decision • HoSPU reports result in SIPB • SPSG decides on aligned strategy
Output	• Strategy is aligned

4.7 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)

4.7.1 Share Standardization and TSI Input Plan with ERA

Stakeholders	• **I/C**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (SPC) with ERA representatives • **C**: SP Domain Team (SPDT) • **A**: SP Steering Group (SPSG) • **C**: IP System Experts (IPSE) • **C**: European Union Agency for Railways (ERA) • **I**: System and Innovation Programme Board (SIPB)
Pre-conditions	•
Triggers	• Update of the Standardization and TSI Input Plan
Frequency	• Annually • On-demand
Input	• Standardization and TSI Input Plan
Process description	• SPC coordinates Update of Standardisation and TSI Input Plan (4.2.1) with SPDTs, IPSEs and ERA representatives in SPC

4.7.2 SPC requests Validate System Pillar work plan by SPSG

Stakeholders	• **R**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Coregroup (SPC) • **A**: SP Steering Group (SPSG) • **I**: System and Innovation Programme Board (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

<table>
<tr>
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<td>Process description</td>
<td>

SPC creates or updates project planning document for next project phase, according to

5 years planning
Updated Standardization 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 Coregroup (SPC), with Engineering Service team
C: Architecture and Release Coordination Team (ARCT)
C: SP Domain Team (SPDT)
C: IP System Experts (IPSE)
C: SP Steering Group (SPSG)
(C): Working Circle
I: System and Innovation Programme Board (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
On demand</td></tr>
<tr><td>Input</td><td>Standardization and TSI Input Plan</td></tr>
<tr><td>Process description</td><td>SPC coordinates overall Standardization and TSI Input Plan planning across Tasks
Per Task ARCT consolidates standardization proposals from all SPDTs, including external enhancements evaluation, and coordination of architecture design roadmap and releases</td></tr>
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			• IPSE consolidate standardization proposals from FA Innovations and sends it to ARCT for integration. ARCT together with responsible SPDTs decides on integration of IPSE proposals.
			• ARCT analyses and assesses all standardization proposals and maintains as Standardization and TSI Input Plan containing
			  ○ Type
			  ○ Topic
			  ○ Date
			  ○ Responsible SPDT
			  ○ Proposed standardization channel (Publication by System Pillar, Standardization, Regulation by TSI)
			  ○ Proposed grade (Strict specification, Core specification, Market specification, Guideline)
			• SPC consolidates overall Standardization 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 Standardization and TSI Input Plan (4.5.2)
			• SPC triggers Publication according to validated

<table>
<tr><td></td><td></td><td><table>
<tr><td></td><td>Standardization and TSI Input Plan (4.3.6)
• SPC triggers Share Standardization and TSI Input Plan with ERA (4.7.1)
• SPC triggers Share Standardization and TSI Input Plan with RASCOP (4.8.1)</td></tr>
<tr><td>Output</td><td>• Consolidated Standardization and TSI Input Plan, ready for validation of SPSG</td></tr>
</table>
• Manage technical priorities of Tasks (4.2.1) with T1.RSDT and all ARCTs
• SPC updates
  ○ financial planning
  ○ schedule
  ○ organizational structure proposals (SPDTs)
  ○ work package planning
  ○ Risk & Opportunities
• HoSPU presents document and project plan including rational during SPSG meeting
• HoSPU follows Confirm acceptance of deliverables to SPSG (4.5.14.5.4) for acceptance of deliverable</td></tr>
<tr><td></td><td>Output</td><td>• SPSG has validated work plan of SPC for next project phase</td></tr>
<tr><td></td><td colspan="2">• Validation of Standardization and TSI Input PlanValidation of Standardization and TSI Input Plan (4.5.2) through SPSG
• SPC shares Standardization and TSI Input plan formally with ERA
• ERA updates workload planning according to documents proposed for TSI as channel</td></tr>
<tr><td>Output</td><td colspan="2">• Aligned planning between Standardization and TSI Input plan and ERA aligned workload plan</td></tr>
</table>

4.7.3 Validate and Assess Change Request (Enhancement or Error Correction)

Stakeholders	• I: Head of EU-Rail System Pillar Unit (HoSPU) • I: SP Coregroup • **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 being proposed from JU (SP or IP) work and the SP submits a corresponding (error or enhancement) CR problem 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, so does the CR relate 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.

4.7.4 Prepare, validate, and solve Enhancement Change Request of JU

Stakeholders	• **I**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Coregroup • **R**: SP Domain Teams (SPDTs) • **I**: European Union Agency for Railways (ERA) • **C**: Innovation Pillar System Experts (IPSE) • **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 IPSE)
Process description	• SPDTs (with IPSE) 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 IPSE) 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 IPSE) 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 IPSE) the topic is escalated to the SP Coregroup for a decision who may involve other SPDTs in its decision process. • In case of new documents, the SP Coregroup needs to agree on the cover CR. • Once approved by the SP Coregroup, 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 Coregroup member to the ERA CCM database. • The CR solution is submitted by SPDT or a SP Coregroup member to the ERA CCM database.

4.7.5 Prepare, validate, and solve Enhancement Change Request external from JU

Stakeholders	• **I**: Head of EU-Rail System Pillar Unit (HoSPU) • **C**: SP Coregroup • **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)**: Innovation Pillar System Experts (IPSE)

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
	  ○ Quality: Does the CR have clear objective, detailed scope (content table of the changes to the subsets), clear transition framework, economic assessment, consideration of technical maturity,
	  ○ System impact: check CR impact to SP architecture, and operational concept and CBOs
	  ○ Planning and project of delivery
	• SPC with ARCT carry out quality pre-assessment
	• ERA confirms (or not) quality assessment
	  ○ If quality insufficient, submitter is requested to redevelop
	• If quality 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 IPSE, other), but focused on the agreed scope (not reopening scope discussions)]

Output	• CR checked and in line with architecture

4.7.6 Support Specification Error Correction Change Request

Stakeholders	• **I**: Head of EU-Rail System Pillar Unit (HoSPU) • **A**: SP Coregroup • **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 problem description with a clear economical, technical or operational rational. • Agreed specification error CR problem description by ERA which is assigned to the SP.
Process description	• The SPDT for drafting a specification error CR: o checks if the draft problem description fulfils the validation criteria of the ERA CCM process STEP 30 o checks if it is really an error according to the ERA CCM process STEP50&51 o reviews and agrees on the content of the CR. o optionally achieves a common view on a possible solution proposal. • The SPDTs for resolution of a specification error CR: o A sub-group shall work out a solution for the CR. o 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 Coregroup 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 Coregroup member to the ERA CCM database.

4.7.7 Request Input from Topical Working Group

Stakeholders	• **I**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (SPC) • **C**: SP Domain Team (SPDT) • **C**: Innovation Pillar System Experts (IPSE) • **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 the defines specific input scope that is requested
	• SPC identifies with ARCT the relevant SPDT(s) and IPSE that are required to deliver the input
	• SPC nominates one SPDT to lead the coordination
	• Lead SPDT is integrated into TWG and supports by
	  ○ Coordinating with IPSE and other SPDTs any input requested
	  ○ Impact assessment for SP architecture and specification
	  ○ Support of defining technical solution with the experts in the TWG

Output	• SPDT is integrated in TWG and provides requested support

4.8 International and European Standardization Organisations Interaction

4.8.1 Share Standardization and TSI Input Plan with RASCOP

Stakeholders	• **A**: Head of EU-Rail System Pillar Unit (HoSPU) • **R**: SP Coregroup (SPC) • **C**: SP Domain Team (SPDT) • **C**: IP System Experts (IPSE) • **C**: Rail Standardisation Coordination Platform for Europe (RASCOP) • **I**: System and Innovation Programme Board (SIPB)
Pre-conditions	•
Triggers	• Update of the Standardization and TSI Input Plan
Frequency	• Annually • On-demand
Input	• Standardization and TSI Input Plan
Process description	• SPC prepares Update of Standardisation and TSI Input Plan (4.2.1) with SPDTs, IPSEs and ERA representatives in SPC • SPC requests Validation of Standardization and TSI Input Plan (4.5.2) through SPSG • HoSPU shares Standardization and TSI Input plan formally with RASCOP • RASCOP updates planning according to documents proposed for Standardization as channel

Output	• Aligned planning between Standardization and TSI Input plan and RASCOP Workload plan

Annex C: Background and rationale

Contents

Content of this Annex

This document shall explain the thoughts and rationale behind the structural design in the governance document and shall answer the FAQ.

It describes

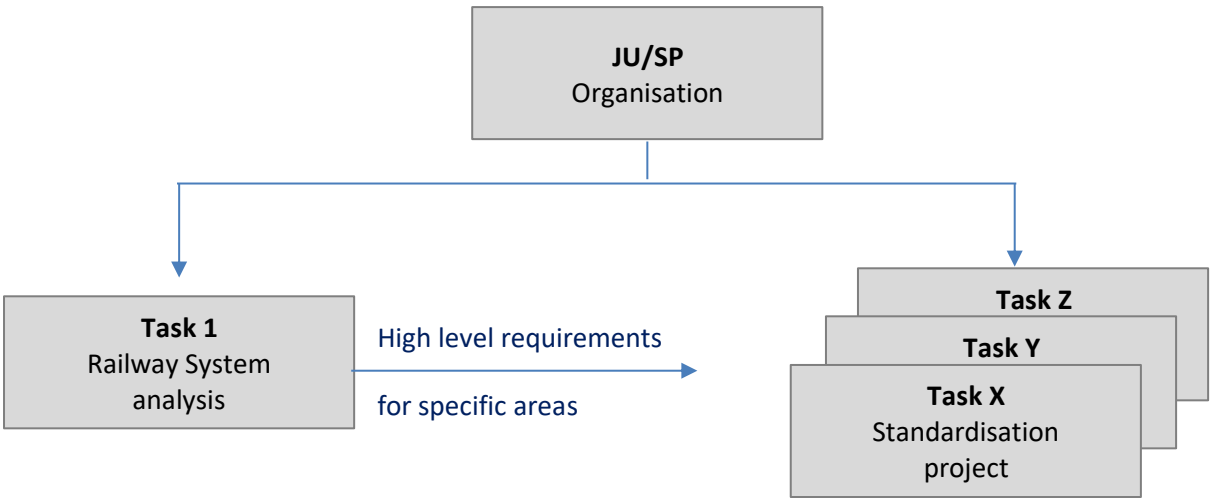
- the important difference between content structure and organisational structure,
- the major interaction principles between the layer SP, Task and Domain ("backbone = requirements management")
- the 5 "System levels", their level of granularity, and the work allocation for them
- a clarification of the scope and role of Task 1 and its limitations
- the mechanism how to handle the inevitable parallelisms in the design process

Content structure versus organisationnel structure

The content structure describes the work items that need to be built in a certain sequence to create the deliverables. The organisational structure defines the team structure and the control flow.

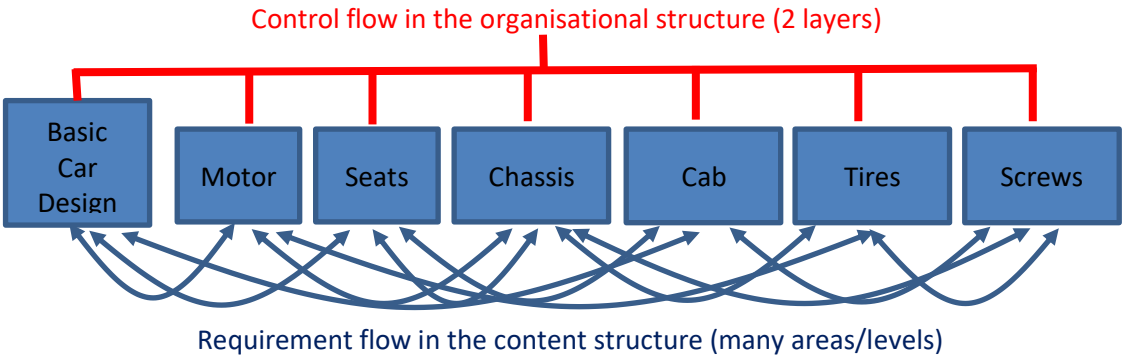
Content structure and organisational structure are not identical. Content structures have many levels of details and are connected in all directions by the "flow of requirements". The organisational structure is designed along the "control flow" which should be as simple (top down), efficient, and effective as possible. The control flow should not have many layers like the content structure has, otherwise organisation and communication get inefficient.

For example, a "design team" for the business architecture of the railway system cannot be the "leading" team for all System Pillar projects. Design work and program management is not the same. The Task 1 analysis and design team contributes important requirements to the SP projects, but the progress management of the SP is done by the SP Coregroup/the JU.



Analogy: Designing a new car model is a content task and designing a car seat in detail is a content task. But in no automotive company the team for the basic car model design is leading the design team for car seats in all details or its progress, they are just exchanging requirements – in both directions. The team for seats has the experts for seats that should design their important details. The product management for a car model *leads* both teams - but the product management is just

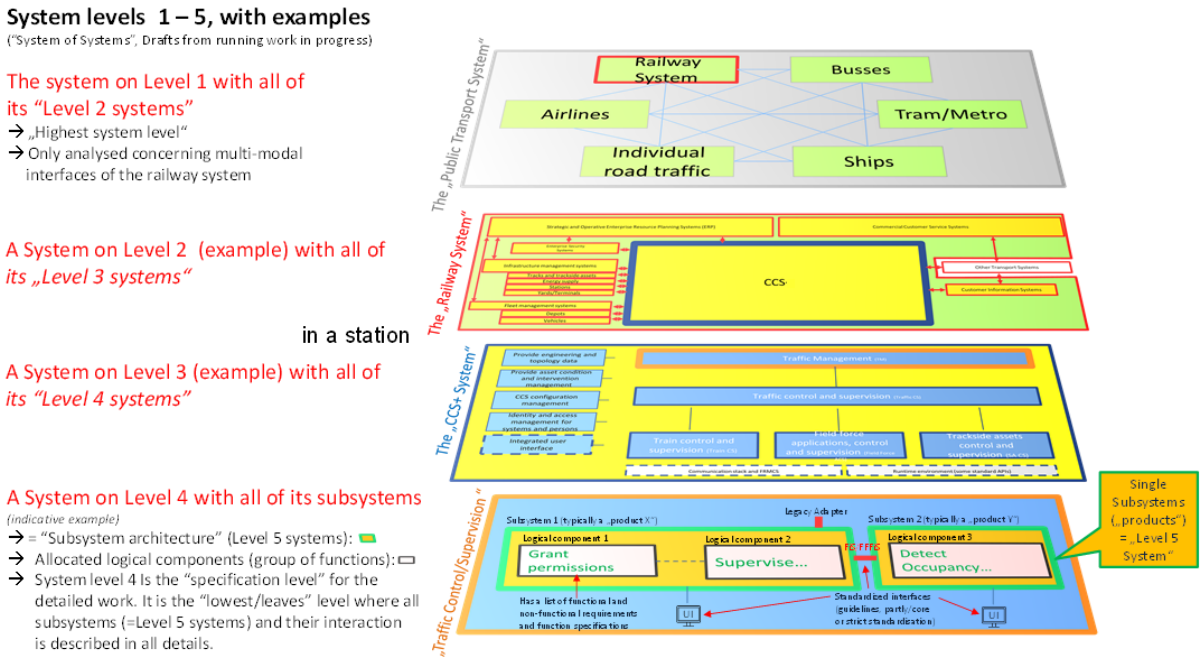
ordering and coordinating designs, not doing the detailed design work. And although the number of levels in the component hierarchy is quite high, the organisation should have as less layers as useful.



Only a small part of the overall requirements is defined by the basic car design. Many requirements are created directly in the component design teams internally – just needed to make the components work. Components are seldom “green field” or completely derived top-down. They had their own evolution and learning process, their own state of the art, and their changes create unwanted cost and diversity. Therefore, the requirements flow is not just top-down. Requirements need to be assessed with both views – top-down and bottom-up. An economically successful new car model for example tries to make use of existing components (cross-sector, if possible) or just introduces small enhancements.

System Levels 1-5

Because of the size of the Railway System, it is necessary to distinguish for the content structure between different *level of details (design level)*. There is a hierarchy of process and system architecture levels (shown here by examples per level):



Although the word “system” is used in this hierarchy as a generic term, it has a slightly different meaning per level. On the lowest level (Level 5, subsystems/products, specification level) it is

describing real technical systems in connection with their usage processes. On Level 2 (Railway System) it is describing mainly a (business2business) process organisation, where different information flows between organisations are standardized (more process specification, less technical specification).

As a simplified explanation of the work allocation can be done along these System Levels (explained more in detail in later chapters)

- **The SP Coregroup** manages progress of and collaboration between the teams that are responsible for a system level 1-4 (Tasks, domains)
- **Task 1** defines business improvements for System Level 1 and 2 – selectively (only where standardisation potential is identified, that is in scope of the SP). For this a generic business process architecture is defined on a high level.
- **Task 2,3,4,…** define the operational processes and architecture for a System on Level 3 (like "CCS" or "Energy supply"). This is an analytical work that especially breaks down process and system requirements and allocates functions.
- **Domain teams in a Task** design a system on Level 4 (like "Traffic Control and Supervision") and the precise specification (FRS, SRS) for its "subsystems" on Level 5 ("products"). Detailed specification may be carried out in the System Pillar, or delegated to an Innovation Pillar Flagship Area, or to a third party (to be defined case by case).

For the System Levels the design tasks are quite different. System Level 1-4 are called "analytical architecture levels", because they are just analysing and refining requirements, breaking down generic process steps or allocating functions to abstract "systems". The information flow is described just in generic terms reflecting the generic functional needs (no details of data description, functional algorithms, or protocols).

The System Level 5 ("subsystems", "products") is quite different – here the design work creates the real "standardisation specification" that can be used for in driver rule books, process training, development, or tendering. It includes precise system models, interface specifications and procedural rules. This specification Level 5 is *implementing in detail* the requirements of the analytical System Levels 1-4.

Requirement flow

The "connecting" highway between design work and control flow is the requirement flow. A requirement is an aspect of a deliverable, and because of this it is the atom of the progress monitoring and remits. But an agreed requirement is also a content design(change) task. The requirement flow between all levels and their processes/systems is complex and needs to be automated (digitized) in an "industrialized/automated/tracked" process.

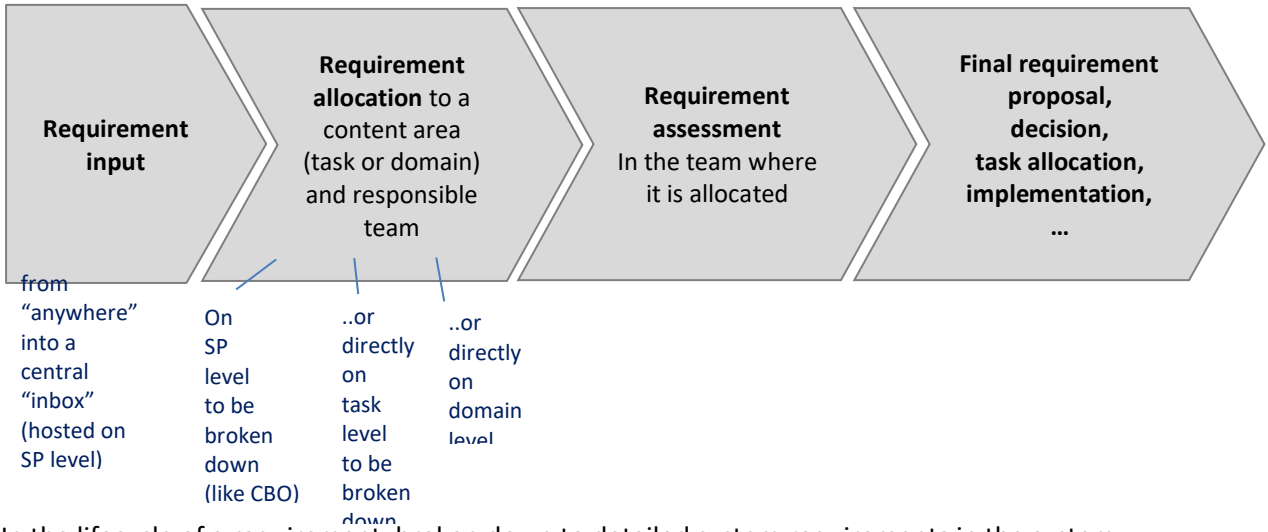
- **Top-down requirement flow**: "Customer/business Requirements" on a higher level are broken down to process and system requirements on lower levels.
- **Bottom-up requirement feedback or creation**: In the break-down process some requirements may be not feasible or economically viable, and need to be changed on higher levels
- **Requirement amendments**: Customer/business requirements on high levels cover only a part of the requirements that are needed for working systems/processes. On lower levels a

lot of technical/process requirements need to be added, for example to fulfil technical regulations.

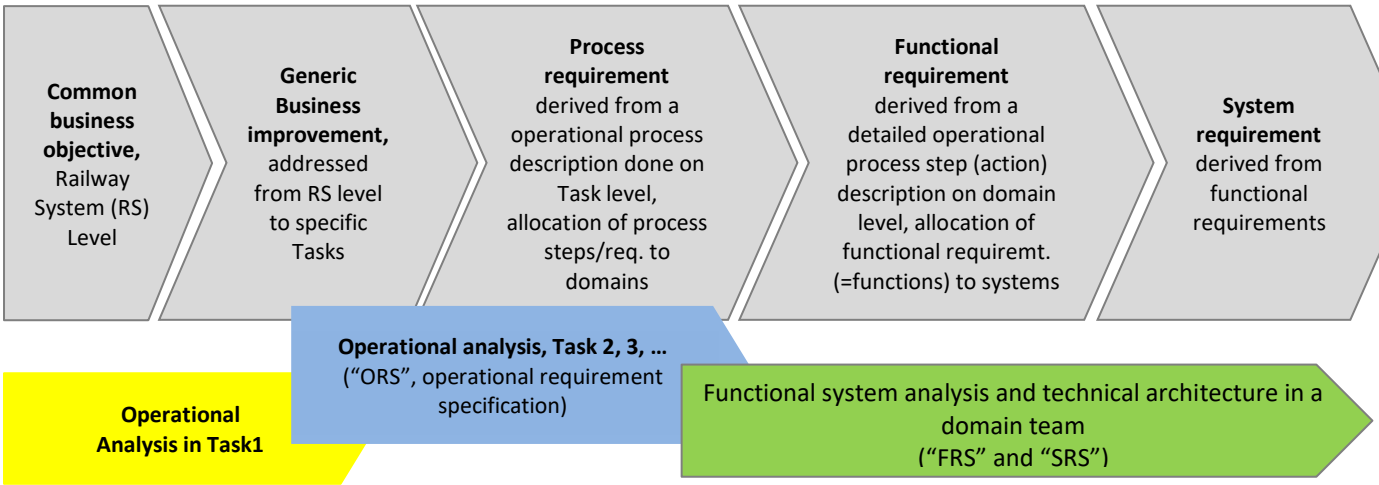
- **Horizontal requirement flow:** Systems and processes need for their functionalities services from other systems/processes. This requirement dependency can theoretically exist between any systems/processes on any Process Level. This requirement flow typically creates the largest number of requirements.

Requirements are never "complete and right for ever" – only stable for one process release or system release. Requirement sets of parallel systems evolve in parallel, and their implementation needs to be synchronized. There is seldom a "green field" situation for a requirement set. Requirements can come from any source at any time. New requirements are broken down to different levels (from a railway system CBO to the tolerable hazard rate of a point-machine object controller socket connector).

Because there are ten-thousands of requirements triggering the design process of a large process landscape/architecture that are coming up over time at any place and from any source it is highly important that the content structure simplifies the allocation of requirements; and that organisational structure encapsulates (cascaded structure) the assessment, decision (of final proposal), and implementation of requirements. It is not possible to discuss all requirements at all levels of the design organisation (iterating up and down), this would overload and slow down everything by far too much. The (electronic) workflow scheme is (just the basic steps):



In the lifecycle of a requirement, broken down to detailed system requirements in the system requirement specification, the responsibility changes during the brake-down process.



In the same way the operational analysis on railway system level, Task level and on domain level produce different levels of details for the process description:

System Level	Area (example)	Level of process details, examples (indicative)
Level 1	Public Transport	The basic requirements, how railways and other transport systems shall interact concerning management connections in a station
Level 2	Railway System	How shall customer care, ticket sales, customer information, TMS and CCS interact *in general* to manage a deviation (described as basic requirements)
Level 3	CCS	How shall different actors in the production (trains, field forces, ..) be coordinated to execute a changed plan (requirements, basic process)
Level 4	Vehicle Control and Supervision	What processes shall happen onboard in general when the movement authorisation changes (requirement, basic process).
Level 5	Onboard Safety Logic	What is the safety reaction to a change of the movement authorisation

The operational design work on Level 3/4 is different to Level 1/2, and needs to be 1:1 mirrored with the system design work. As described in the table above the operational design here goes much deeper into process detail and needs specialized experts. For example, the operational design on Level 1/2 could produce a requirement like “The dimensioning process for the energy supply shall be aligned with the traffic planning process in way …”. A high-level requirement. But the detailed operational processes how to plan a schedule will be defined on Level 3/4, not on Level 1/2.

A close collaboration of operational experts and system architects is needed on Level 3/4. Typically, they have different skill profiles. But they shall work out a concrete process/system model for a concrete scope together in a very interactive way, that transports the needed knowledge from operations to system design. It is a close collaboration of system users and system architects, working on a special system area.

The dependency management is implemented by the (digitized CCM) requirements flow. As explained above the requirements flow is not just simply “top-down”, it has several routes inside of a design process of a large system. It needs iterations that end with a coherence check for each release. As in all larger design organisations it is not intended to follow a “first this, than that” sequence. Instead, an agile continuous derivation process needs to be handled in the requirements management:

Requirement management process

The participants of the Requirements Management Process are:

- **“Modelling Service team” on SP Level**: Hosts the central requirement management platform and moderates the process of the requirements management. Consolidates the requirements of System Level 1-3 (where needed at the). Escalates issues to the SP Coregroup if needed.
- **SP Coregroup**: Tracks the progress of the requirement management and proposes final requirement definitions to the System Pillar Steering Group.

- **Task 1:** Designs and contributes business process improvements for interactions between larger business areas of the railway system (System Level 2) and for multi-modal process interactions. The business improvements are described on a high level in the requirement management platform.
- **Task 2,3,4…:** Design and contribute requirements on System Level 3. Consolidate the requirement proposals for System Level 4 and 5 for all the domains in its tasks.
- **Domains in a Task:** Design and contribute requirements on System Level 4/5.

Obviously, the design work on the 4 "analytical" Levels 1-4 …

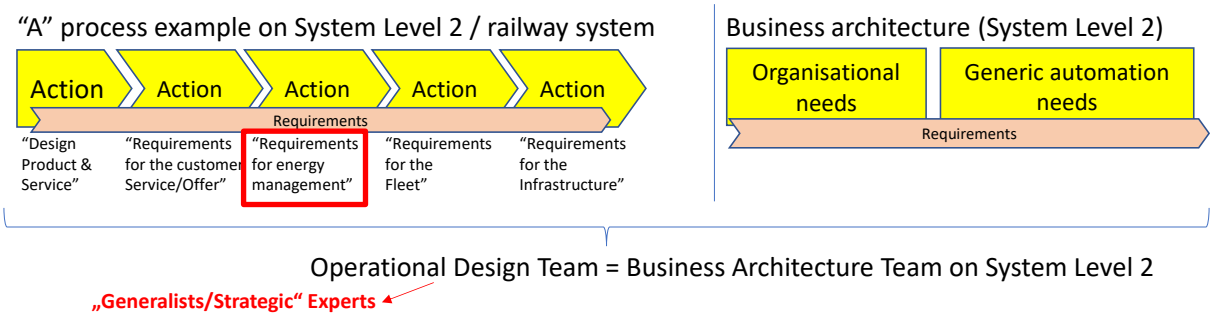
- … needs very different types of skill sets and design team constellations (generic railway knowledge for Task 1 ("business developers"), expert knowledge for a domain team)
- … go from "business case driven" down to more "practical" requirements, the deeper the Level is
- … are not following a pure process hierarchy. The need to process a changed plan on Level 3 can have many reasons, not only the management of connections in the case of deviations. Scenarios per System Level can have independent designs that just implement requirements "from all sides".

About Task 1

The System Pillar is not standardising everything in the railway system and is not "integrating" all existing railway standardisation work (e.g., from CEN/CENELEC) into its processes. It has a distinct focus for which the resources are suitable. The focus can be extended or changed over time.

Also, the form and completeness of standardisation is different per System Level. For example, it is not intended to standardize the structure or business model of all companies in the railway sector (System Level 2). But the design of the CCS onboard component architecture should be very complete. Some may buy energy and others may produce it themselves, and there are many different business and asset structures – this will not be standardized. But the control interfaces in the energy management might be standardized – which is a selective issue. Many aspects of the public transport system or the railway system are not relevant for the fulfilment of the targets that are formulated in SBA, Masterplan, or System Pillar report.

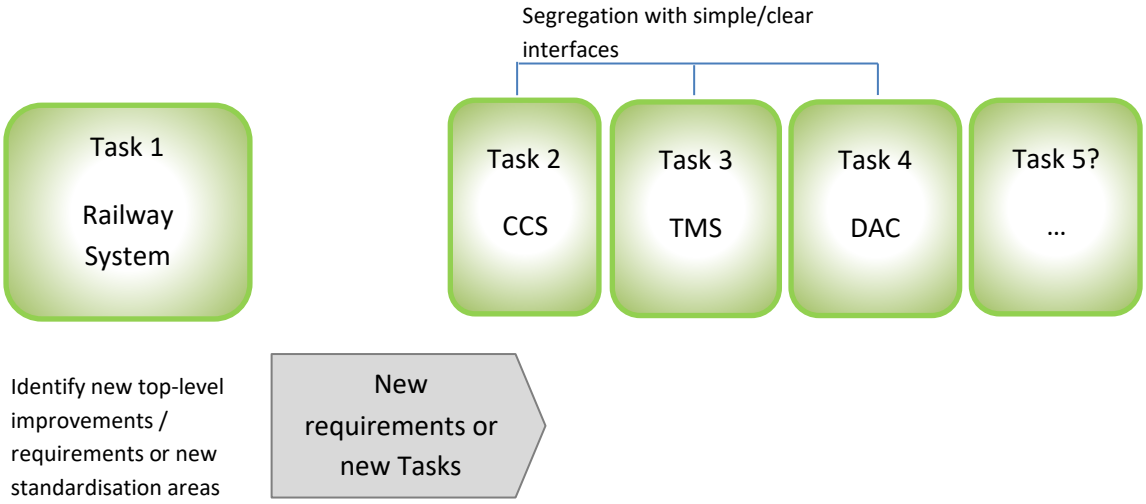
Therefore, the design work for System Level 1 and 2 is not intended to describe all process and improvement aspects of the full railway landscape, when they will never be standardized inside of the SP. This would also not be possible with the available resources. Instead, the main ambition for the higher System Levels (especially 1-2) is to get a complete list of the needed and important improvements (As-Is analysis, pain-points) in selected interaction processes in form of a requirement set, explained by improved business process solutions as much as needed to describe the rationale behind the requirements. The lower analytical systems need to be more and more complete (3-4), depending on the agreed granularity of standardisation per Level and System. Example:



Requirements are broken down by understanding the business processes and their targets. The operational design team on this level ("business architects") have a generic knowledge of the full railway system and analyse all areas concerning the needed improvements.

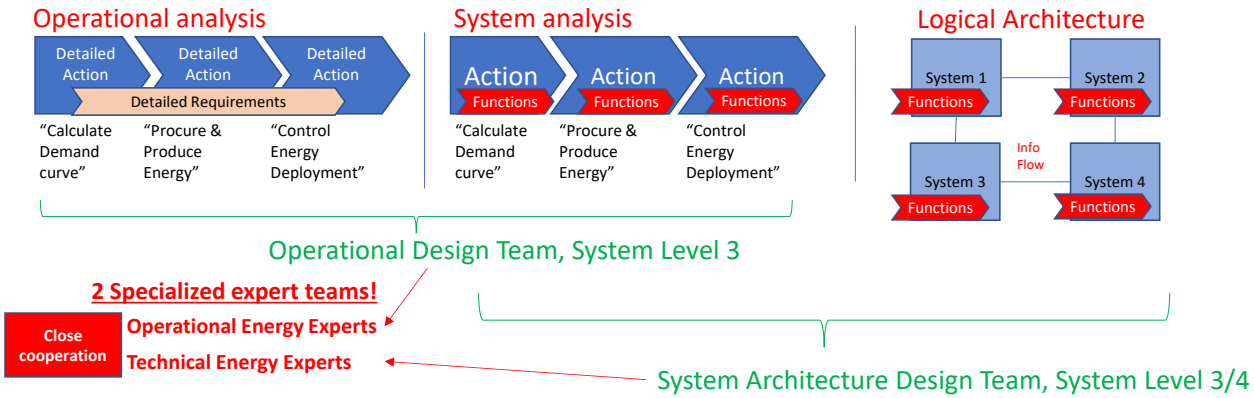
For example, the "Requirements for energy management" (red box) of railway system level will just describe, what *improvements* are needed for the *interactions* between energy supply design and fleet energy technologies design. These requirements describe selectively what should be improved in the interaction of these design processes for example to reduce the energy consumption – but not all details of these design processes on both sides are described.

Important: Task 1 may design a full business process landscape on a high level, but deeper As-Is analysis will be done only for selected issues. Task 1 is not producing specification like Task 2,3,4…will do. (New proposal: TMS and DAC seen here as separate tasks, because of their size and number of subsystems, explained in later chapters).



Starting on “brownfield” and working in parallel

In a theoretical green-field approach (does not exist) the workflow for System Level 3 and 4 has this form:



De facto – and especially later in the standardisation life cycle – this pure top-down sequence is not the possible workflow, it is just fiction. Because on all levels things are partly already existing or released, some teams are faster and some are slower, and some design teams for the railway system have even not started, the “parallel + updating workflow” is the normal mode of work. Good and worthful new contributions can come at any time from any side. Example: Sometimes SP might be faster with the architecture design that influences a system design, and in other cases the IP will be faster with the proposal of system functionality, that should be integrated into a whole systems architecture by the SP. Both needs to be possible in the workflow.

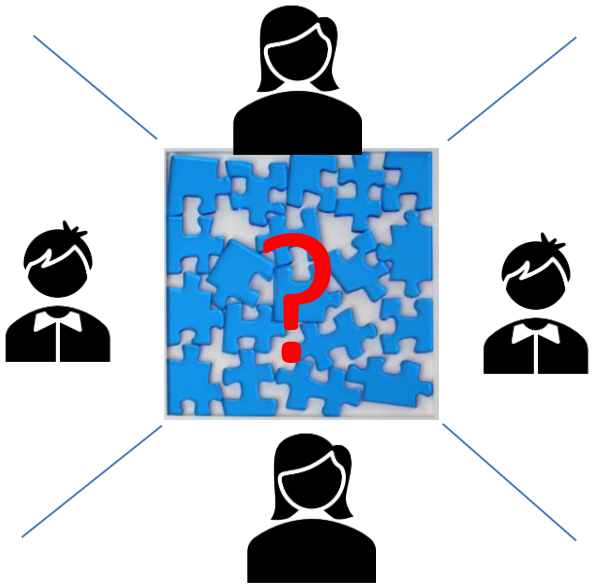
Sometimes specification is done outside of the JU in an asynchronous process (e.g., CEN/CENELEC). And since single operational processes (defined on Task level) are running cross-landscape and allocating functional requirements to different systems, a pure “single-break-down” process will never succeed for architecting a large specification landscape and its lifecycle. The generic break-down is supporting the overall functional allocation in the beginning, but for the big task of implementing a continuously growing list of detailed requirements it does not help very much – especially because the “big picture” is created also quite a lot by bottom-up proposals (a central team is not able to design “everything”, no matter how large it is).

Analogy for this working mode challenge: Different people are designing a jigsaw puzzle in different rooms, and the top-down picture is only known “roughly” on all sides. There is no agreement about the size or form/edges of the puzzle pieces in the beginning, only a list of buzzwords for things that need to be drawn. How to go on? How will this ever fit together? Especially when it is a 5x5 meter puzzle with 50’000 pieces, and 20’000 are already existing, coming from other puzzles? And the work needs to start directly, no time for long design discussions??

The solution is obviously:

- All are working on the same digital whiteboard
- There is a board-master that looks, if the evolving overall picture is nice and fitting to the rough picture he communicated in the beginning, or continuously refined during the work
- Everybody has an area he shall design, fitting to some of the buzzwords

- Everybody is seeing, what the others are doing, especially the neighbours
- When it comes to the design of precise edges between two pieces, two partners must design together
- The persons responsible for an “area” of the puzzle need to meet regularly to check if the picture in the area really makes sense.
- There are independent assessors that test the puzzle areas if the pieces really fit together and create a meaningful picture.
- If somebody is waiting for somebody else in the adjacent areas to be ready – but this is not happening – he works with working hypothesis or proposals for the adjacent areas, transparent for all others. His neighbour could directly or later response to the foreign proposal.
- When somebody places his puzzle-piece proposal on the whiteboard, everybody can intervene (change management process). And he directly sees if it fits to the neighbourhood.



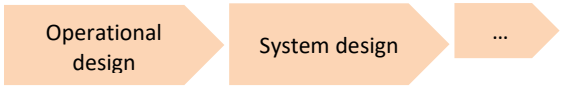
This working style is called “continuous integration” (CI). It is also working the same way when the puzzle is existing completely later and needs to be changed in parallel everywhere.

The translation to the SP process is:

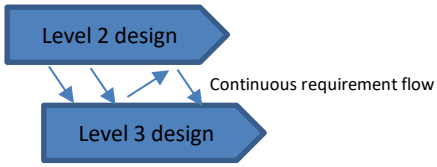
- The “whiteboard” is a central digital model (storing requirements, processes, and architecture in releases) hosted by the central modelling team of the SP. The model assures – like in the jigsaw puzzle the edges of the pieces – that everything, that shall be inserted, is linked and fits. It does not matter if this happens bottom-up, top-down, left-to-right…or all of this in parallel. Every change fits and is agreed, or does not fit and alignment tasks are defined to make it fit. The central modelling team (“board-master”) is moderating this completion and change management process of the model (requirements, processes, architecture).

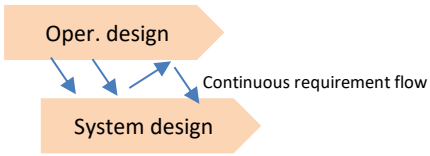
- In the beginning the model is “filled” with the existing and agreed work or for example TSI specifications (at least connections to it). By this every new element automatically needs to fit to exiting specifications (can exist on high or low level) – or can bring an change request.
- The “area” view in the analogy is the “Task” in the System Pillar, for example for CCS. It assures a “pre-consolidation” of a certain area of the railway System. The assessment happens in the requirements management process.

In most cases not possible (or much too slow)



Recommended





“White spots on the map”

In the “SP” puzzle many areas are not designed with detailed puzzle pieces (just “very large ones”). How to structure a station, how to build tracks, the catenary system mechanics, the physical form of a ticket machine, the size of a seat – many areas will not be covered in the SP, and there will be perhaps no expert teams available in SP to discuss interfaces to these areas. Task 1 can do a list of single deep dives (areas with high potential) to find out what the requirements of some of these “white spots on the map” are. Task 1 can act as a discussion partner surrogate for the SP teams, can propose new tasks of can transport the dialog to sector experts. In the end the existing SP teams will need to design the interface and process proposals from their side (e.g., “open APIs”), if a standardisation is needed.

- ## Growing standardisation scope over time

The content (deliverables) structure for the System Pillar is following the concrete demands that were formulated by sector companies, programs and initiatives up to now (especially in the preparation process for the system pillar report). Currently known and concrete standardisation areas are CCS, TMS and DAC.

The content structure for the System Pillar (and as a consequence also the organisational structure) should reflect the currently known standardisation demands inside of EURAIL. It should not define standardisation areas with unknown standardisation targets (like for “Infrastructure”). The integration/connection of other standardisation work (like for EUROSPECS or CEN/CENELEC Workstreams) should be discussed explicitly before extending the organisational structure inside of EURAIL. Later on, especially also derived from the Task 1 and from the Innovation Pillar work (e.g. in FA3, 4, 5, 6), more standardisation areas will be identified with concrete standardisation targets. Therefore, the landscape of standardisation areas (and organisational teams) will probably extend

over time. Later extensions are possible at any time on request of any sector party, to be decided by the System Pillar Steering Group and the EURAIL governing board.

Resulting organisational structure

- ## Principles

1. The structure shall define responsibility scopes that allow as much as possible self-sufficient teams – handling complexity internally, with as much as possible small interfaces externally. For example, the CCS processes have a very strong design dependency, although they are distributed to trackside and onboard. The idea of having a "vehicle team" and a "trackside team" would create a different and less efficient organisation.
2. A matrix (cross-cutting work streams overlaying the domains) is needed but shall be simplified to avoid its complexity and slowing down effects. Simplification is achieved by establishing systematic automated coordination platforms for the requirements management flow, and for System Model integration/validation (processes and architecture). Both platforms are provided as services and coordination processes on System Pillar Level.
3. Process design and system design are two sides of the same medal and shall be handled as "design pairs" existing on each organisational layer with different level of details, but always following the same structure as a design pair. A "process" is understood as a mixed sequence of human and system actions, that cannot be designed in an isolated way or at distant places.
4. Teams with a too large or too small scope or a diverse skill mix shall be avoided. A "good size and team profile" for a domain team is for example the scope "traffic control and supervision". For Traffic Management a "core scope" – planning, deviation management and incidence management – can be handled in one team in an efficient way. Extending the TMS scope also to commercial functions or customer information systems would create a too large team. A second structure makes more sense.

- ## Handling the large size of the scopes

In the beginning of the System Pillar there is only a small number of major tasks currently known. In extension of the System Pillar report and also based on the sector feedbacks it is recommended to standardize the Traffic Management and DAC in their own Tasks. The reason for this change recommendation is

- The analysis of the working scope led to the conclusion, that these scopes are large and would create a too large "Task 2"
- The process and system interfaces between CCS, TMS and DAC are simple enough to split the architecting work at these point

The "Task" is the most important organisational structure element to reduce complexity in the large SP scope. Tasks are long-term projects. Each of the tasks 2,3,4,.. represents a concrete and existing standardisation Task. Tasks can be encapsulated in a good way concerning operational process design, system architecture design, migration, etc.. The Tasks correspond to a typical organisational approach inside of railway companies: Whereas Task 1 is the "business development" task for the

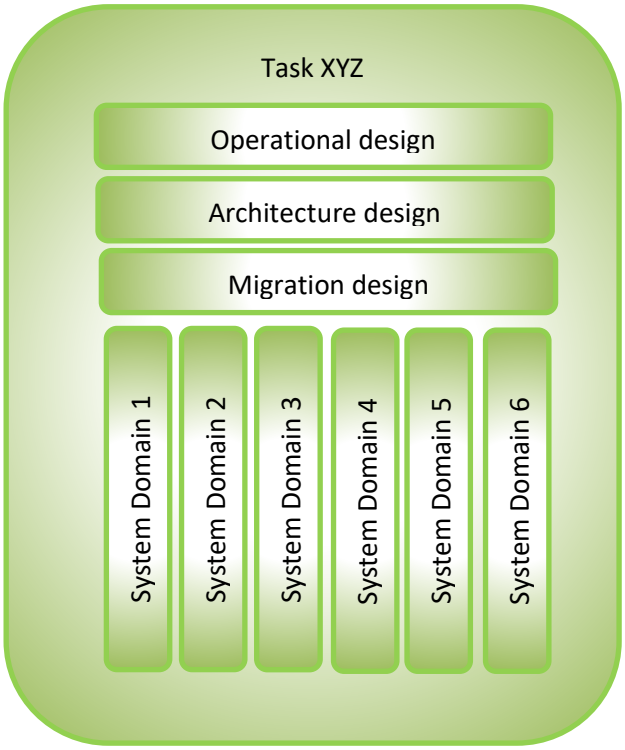
System Pillar, the other Tasks are the “projects” for known concrete standardisation targets, allocated in organisations with a homogenous skill profile.

Task 1 is different since it is not specifying a “complete system with all of its requirements”, and it is not creating standardisation specifications by itself (System Pillar is not standardising “everything” in the railway system). It selectively defines (based on existing work like from Linx4Rail) improvements that need to be implemented in existing or new tasks. It defines selectively top-level targets for those requirements that are relevant for the standardisation work in the other Tasks (e.g., the top-level capacity management requirements broken down for CCS and TMS).

The Tasks 2,3,4,.. shall be connected by simple interfaces/process interactions that are defined early and are decoupling the dependencies in the development work. Each of them shall implement internally…

- Operational design process on Task-Level
- Architecture coordination process on Task-Level
- Migration design and architectural support on Task-Level

Besides of these Task-internal functions the Tasks (like CCS) have still a quite large design scope and will need a substructure for their design work. This substructure is built by the “domains” and “cross-cutting roles”. A Task should have an appropriate number of domains, that does not create a too high complexity. Every domain should solve a concrete and existing standardisation demand (like a long-term project) inside of the EURAIL scope. Out of this, the scheme for a Task structure is (except for Task 1):

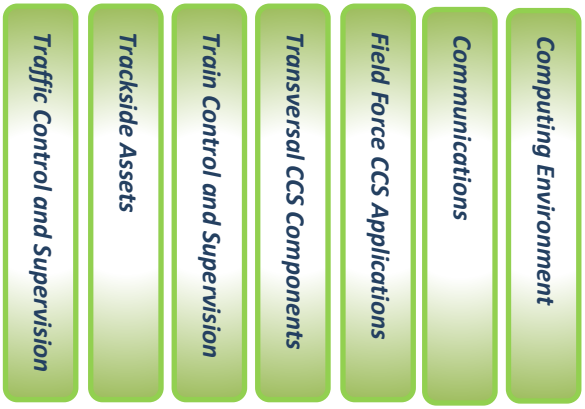


The three cross-cutting roles and domains could be worked out by any structure of resources, the roles just must be allocated to contact persons. The work can be split to specialized teams or all together done by one person – depending on the size or structure of the task. Task 1 will perhaps

only be one team, whereas Task 2 will probably around 10 teams. Both must assign the roles of the picture above to contact persons, whatever structure they have.

The inner structure of the domains is decided in the domains. But they shall again – on their lower System Level – assign their roles for architecture design, operational design, and migration (needs to exist on all system levels) to contact persons (typically the domain leads).

Domains of a Task are structured along the major system structure of a task scope. It is not working to "mix" a structure along processes (like ATO) and additionally along systems (ATO is implemented by multiple systems). This would create a high redundancy and complexity. Processes and interfaces are worked out in collaboration of the relevant system domain teams (or Task teams). A domain structure "along major systems" means for example for the CCS Task 2 to follow its major systems structure like this (the teams are already existing in this structure for several years)

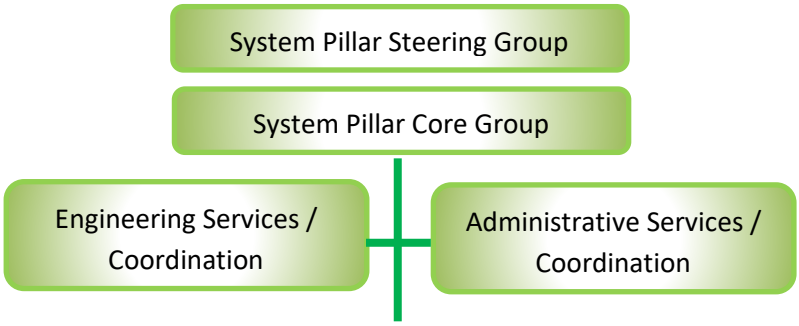


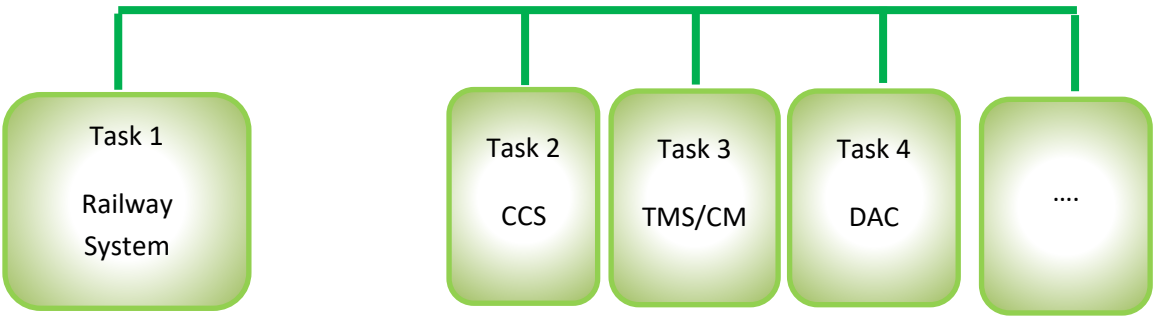
The inner structure of Task 1 is different because of its different mission. Task 1 should be executed by only one team of railway business analysts who analyse improvement potential along the full scope of the railway system. The analysis addresses main the identification of requirements, but also the basic concepts for optimisation tasks concerning processes and functional allocation or generic migration concepts. One important focus of this analysis is the identification of improvements concerning the external interfaces of existing tasks (e.g, improvements for external CCS interfaces).

Conclusion: The large size of the SP Design scope is handled by a cascaded structure of Tasks and Domains.

- ## Centralized services on SP Level

To avoid too high resource redundancies, some functions are centralized on SP level. These cover the "administrative services/coordination" and "engineering services/coordination".





Administrative services/coordination

- **Project Management Office** (financial management, progress tracking, reporting, communication, publication management, etc.)
- **Economic Analysis service** (analysing specific business cases as a service)

Engineering services / coordination

- **(Central) Modelling service** (incl. methods & tools definition for the whole system Pillar, support of the modelling platform, derived CDM catalogues)
  Conceptual, semi-formal or formal modelling is needed to produce high quality requirement sets and specifications. The models need to fit together in the end result (Model coherence and whole-system validation). Modelling is high-skill work for modelling experts (scarce) that needs to be centralized (modellers then partly delegated to tasks and teams to support local modelling work). The central modelling service is also assuring 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. Modelling includes processes, systems, and migration states.

  The Modelling Service provides the central platforms for the SP coordination work:
  - Requirements management platform and methods and moderation of the creation, negotiation and CCM process for requirements
  - Document management platform and methods. Repository for conceptual documents, coordination of the translation of concepts into formal models.
  - Central modelling platform and methods, including derived views and exports like for CDM
  - The “Standardisation and TSI Input planning”, mainly structured along the catalogue of processes and interfaces/systems. The modelling service supports/initiates/triggers the collaboration of different teams in SP (or EURAIL, externally) that is needed (e.g., often multiple teams needed for the definition of one interface or cross cutting process).

- **External Architecture Support**
  System architects are very scarce resources. It is assumed that a central pool of (external) architects will need to support the SP Coregroup (e.g. architectural issues on top level), the modelling service, the Tasks or single domains.

- **PRAMSS Requirement management on Top-Level**.
  The Modelling Service is just moderating the requirements flow (not creating), coming from multiple sources, and functional requirements are directly allocated to Tasks and domains. But especially the PRAMSS requirements (most of the non-functional requirements) additionally need a central coordination, top-design and control of the requirement implementation.
  The PRAMSS team is defining strategies (e.g. safety strategy), policies, methods (e.g. concerning security design) and is the primary source for PRAMSS requirements on the top-level. The PRAMSS to support Tasks and domains in the break-down process for the PRAMSS requirements.