SYSTEM PILLAR

Standardisation and TSI Input Plan - Version V2.0

Manuscript completed in 2025

Brussels: Europe's Rail Joint Undertaking, 2025

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Contents

Abbreviations and Acronyms

Abbreviation and Acronyms	Description
API	Application Programming Interface
APM	Automatic Processing Module
APS	Advanced Protection System
ASTP	Advanced Safe Train Positioning
ATO	Automatic Train Operation
CCS	Control Command & Signalling
CEN	European Committee for Standardization
CENELEC	European Electrotechnical Committee for Standardization
CM	Configuration Management
CMS	Capacity Management System
CR	Change request
DAC	Digital Automatic Coupler
DR	Digital Register
EC	European Commission
ERA	European Railway Agency
ERRAC	European Railway Research Advisory Council
ERG	Euroradio Gateway
ETCS	European Train Control System
EVC	European Vital Computer
FA	Flagship Area
FDFT	Full Digital Freight Train
FDFTO	Full Digital Freight Train Operations
FFA	Field Force Application
FRMCS	FRMCS = Future Rail Mobile Communication System

IEC	International Electrotechnical Commission
IF	Interface
IM	Infrastructure Manager
ISO	International Organization for Standardization
OB	Onboard
OMS	Onboard Monitoring System
PE	Plan Execution
PER	Perception
PRAM	Performance, Reliability, Availability, Maintainability
REP	Repository
RISC	Railway Interoperability and Safety Committee
RTO	Remote Train Operation
SCI	Serial Communications Interface
SFR	Sector Forum Rail
SP	System Pillar
TACS	Track Side Assets Control System
TCMS	Train control and management system
TCS	Traffic Control System
TDS	Train Display System
TL/TI	Train Length / Train Integrity Determination
TMS	Traffic Management System
TPS	Trackside Protection System
TS	Track Side
TSI	Technical Specification for Interoperability
UIC	International Union of Railways
VK	Vehicle (wagon and/or locomotive) keeper
WG	Working Group
WK	Wagon Keeper
WS	Wayside

1 Context and objectives

The transfer of R&I results of EU-RAIL to the EU standardisation and regulation process is a crucial goal for the railway sector and EU-RAIL.

This process plays a critical role in supporting the harmonised introduction of improvements into the European rail system, supporting competitiveness interoperability, and safety.

The EU-RAIL System Pillar will coordinate the harmonisation outputs and needs from the EU-RAIL programme (both from the Innovation Pillar and System Pillar) within the Standardisation and TSI Input Plan (STIP) – see Annex. At the same time, the STIP is closely aligned with the EC request for TSI revision as well as the EC standardisation request.

This document describes the process for the first revision of the STIP.

Through the approval of the Standardisation and TSI Input Plan by the System Pillar Steering Group,[1] a validated and complete view of the harmonisation outputs linked to EU-RAIL is provided, endorsed by the European Commission, ERA, the European Standardisation bodies and the sector as a whole.

The STIP:

- should enable a more strategic alignment of the outputs of EU-RAIL with the
    - TSI revision process, in particular to the EC request to ERA for TSI revision
    - European standardisation process, and associated EC request.
- support the delivery of mature input to harmonisation channels respecting existing processes, their ownership, and legal status.

In general, the following main harmonisation channels are foreseen (Figure 1)[2]:

- Technical Specifications for Interoperability (TSIs) and associated documents, for example subsets, Application Guides. ERA, EC, RISC
- European Standardisation. EC, CEN CENELEC
- System Pillar documents (normative documents for outputs which may not (yet) be planned for input to the TSI or EN standards). EU-RAIL

[1] The Steering Group is composed of representatives of the Commission, representatives of the rail and mobility sector and of relevant organisations, the Executive Director of the Europe's Rail Joint Undertaking, the chairperson of the states' representatives group and representatives of the European Union Agency for Railways and of the ERRAC

[2] Exceptional harmonisation channels can be considered if requested

Additional harmonisation channels are proposed in some specific cases (ISO, IEC in the standardisation, takes place on international level, etc.). For more details on the harmonisation channels please refer to the document EU-RAIL and harmonisation V1.0[3].

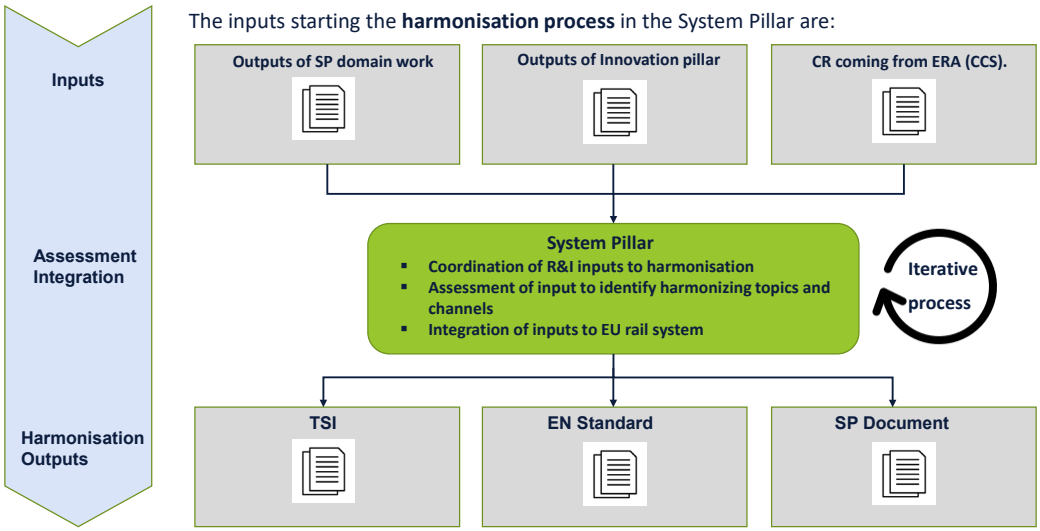


Figure 1: Process for harmonization of standardisation and regulation activities driven by innovations (© EU-RAIL)

[3] https://rail-research.europa.eu/wp-content/uploads/2023/08/20230604-EURAIL-and-Harmonisation_Version_1.0.pdf

2 STIP

2.1 Structure of the STIP

Topics for harmonisation have been delivered by the members of EU-RAIL via the Task and Domains of the System Pillar as well as the Flagship Projects of the Innovation Pillar.

In total, over 200 topics were proposed for the first Version of the STIP. These were analysed by the System Pillar Core Group and EU-RAIL and a classification has been applied to allocate the topic to a manageable number of categories.

Whilst certain topics may have fitted in more than one category, an assignment of one topic per category has been imposed to avoid duplication of topics.

The categories are outlined in the Figure 2. They remain unchanged between the STIP Versions V1.0 and V2.0.

The categories and underlying topics have been compiled in an excel spreadsheet.

The categories and topics are split into two main sections: the main part of the STIP and a section with additional topics.

For the ongoing revision of the STIP, topic content was modified, new topics proposed and some from the STIP V1.0 removed. To ensure traceability between the STIP Version V1.0 and V2.0

- the numbering of the existing STIP items is not changed.
- New STIP items are added to the most adequate category assigned with a consecutive number.
- The number of removed STIP items from V1.0 is not assigned to new items,

Figure 2: Categories for topic classification

Category for topic classification		
Category		**Description**
Main section		
C1	Operational harmonisation	Topics related to operational processes and rules
C2	Evolvability and maintainability	Topics aiming at enhanced compatibility between versions and easy maintainability
C3	TMS and CMS	Topics related to enhanced European TMS and CMS
C4	ATO GoA2	Topics related to ATO until GoA2
C5	ATO GoA3/4	Topics related to ATO until GoA3/4
C6	Remote supervision and control	RTO as application independent from ATO Goa3/4 (can come earlier) specific applications, e.g. shunting yards.
C7	ASTP	Topics related to enhanced odometry and localisation systems
C8	FDFTO	Topics related to enhanced freight traffic including DAC
C9	FRMCS	Topics related to new radio system
C10	Onboard	Topics related to CCS onboard systems
C11	Cybersecurity	Topics for cybersecurity in CCS systems
C12	Safety management	Topics related to safety in CCS
C13	PRAM	PRAM topics
C14	Trackside assets	Topics related to CCS trackside assets
C15	Traffic CS	Topics related to enhanced Traffic CS and interfaces to TMS/CMS
C16	Driving control, Adhesion management	Topics related to adhesion management and driving control
C17	Energy management and supply	Topics related to energy management and operational measures
C18	Bridge dynamics	Topics related to vehicle-bridge dynamical interaction
C19	Alternative propulsion, traction energy	Topics related to battery and hydrogen train
C20	TCMS	Topics related to TCMS
C21	Subsystem Components	Topics considering e.g. braking, environmental conditions etc.
C22	Reduction environmental impact	Topics considering noise, air quality and climate change
C23	Composite materials	Use of composite materials for lightweight design
C24	ETCS CR enhancement	ETCS CR enhancements from ERA assessed by the SP

Additional topics[4]		
C25	Digital asset management, data spaces and models	Topics related to data spaces, data models and asset engineering
C26	Digital Twin	Topics related to Digital twin modelling and digital register
C27	Virtual certification	Methods for virtual certification and implementation
C28	Zero-Onsite-Testing	Use of simulations and lab testing procedures
C29	Drones	Topics related to the use of drones in railway applications
C30	Field force applications	Topics related to field forces (maintenance staff and machines)
C31	Diagnosis, monitoring	Topics related to diagnosis, condition-based maintenance in railway applications

[4] The section "Additional Topics" includes topics with one or more of the following characteristics:

- Topics which do not yet have a defined time planning due to the early state and uncertainty in the development process.
- Topics which are very innovative and disruptive compared to established technical solutions. Acceptance and uptake by the sector might therefore require additional alignment and coordination.
- Topics for which the state of maturity does not allow a scheduled input to harmonisation channels in the short/medium term. Development and specification work is still ongoing, aiming at a higher maturity and the inclusion in one of the next STIP versions.

2.2 Description of harmonisation topics

Within each category, one or more topics are included, with the following information:

STIP table	Information
Category	Topic domain/subsystem
Topic ID	Unique ID per topic
Cat	Category to which topic is allocated
Date	Depends on harmonisation channel (see below)
Channel	Harmonisation Channel (TSI, EN standard, etc.)
Summary of topic	Topic
	Entity
	Key words
	Short description
	Link to detailed documentation
Expected timeline	If TSI: Submitted to ERA (phase1)
	If TSI: Submitted to ERA (phase 2)
	If Standard: Submitted to standardisation (SFR, RASCOP)
	If SP document: SP STG approval
Strategic objectives	Objective
	Requirement and rationale
TSI (if applicable)	Existing TSI (yes/no)
	Existing TSI
	Category
	New/Modification required?
EN standards (if applicable)	Existing standard (yes/no)
	Existing standard
	Category
	Planned in EC Standardisation Request?
	Status of standardisation activities
	New/Modification required? Channel of standardisation
SP documents / Industrial standards (if applicable)	Existing standards (yes/no)
	Existing standards
	Category
	New/Modification required?
Dependencies (if applicable)	Related specification documents
	Blocking point?
	Related domain
	Related FA or WG
Additional Info	Info in addition to previous fields

Figure 3: Topic information

2.3 Meaning of harmonisation channel and dates

As per the document EU-RAIL and harmonisation V1.0[5], the relevant outputs of EU-RAIL will feed into different harmonisation channels, with TSI, EN standards and SP documents as the main channels.

The decision to which harmonisation channel a topic should go is considered case-by-case based on an assessment of the impact of the topic considering various aspects including interoperability, safety, and market impact.

In the following table the different harmonisation options proposed in the STIP are summarised:

Harmonisation channel	Process	Concerned topics
TSI	Potential Input to one or more TSIs. The input is managed via the ERA CCM process for TSI change requests. The ERA pre-assessment template is used to deliver the input and assess the maturity	STIP topics which provide input to the topic described in the EC request for the next TSI revision. In general, topics which need to be mandatory for example due to their impact in interoperability and safety.
EN standard	Input to European standardisation organisations (CEN/CENELEC). The input is delivered via a new work item proposal (NWIP). The coordination with the standardisation working group is ensured by the Sector Forum Rail (SFR)	STIP topics which are related to existing standards / standardisation activities and represent enhancements. In general topics, which are not mandatory but represent a state of the art and a high impact on harmonisation in the sector.
SP documents	SP documents represent an industrial standard and are published after sector approval in the System Pillar Steering Group.	Non mandatory specifications representing a high interest for quick uptake in the sector allowing e.g. common tendering (Example: Publication of the EULYNX specifications)
SP doc -> TSI	Two-step harmonisation approach: topic first published as SP documents and at a later stage input to TSI.	This two-step harmonisation approach is suitable for topics which due to their impact on interoperability, safety and sector harmonisation should go into TSI. However, the current state of development, maturity and sector agreement do not allow for a short/medium term input as CR to

[5] https://rail-research.europa.eu/wp-content/uploads/2023/08/20230604-EURAIL-and-Harmonisation_Version_1.0.pdf

		the ERA CCM process. To allow for a fast sector update including development of products, testing, validation, the specifications are proposed to be first published as SP documents.
SP doc -> EN standard	Two-step harmonisation approach: topic first published as SP document and at a later stage input to EN standardisation	See above, but for EN standard
Other standards (IEC, ISO)	Input to international standardisation	If the standardisation activity for a topic is taking place on international level, links with international standardisation groups are established e.g. cybersecurity

The **meaning of the field *Date*** depends on the harmonisation channel:

Harmonisation channel	**Meaning of date**
TSI	Submission of a mature CR solution to the ERA CCM process (filling of ERA template)
EN standard	Submission of a mature New Work Item Proposal (NWIP) to a standardisation organisation (unless otherwise specified)
SP document	Publication of SP documents by the SP after approval by Steering group
Other standards	Submission of a mature New Work Item Proposal (NWIP) to a standardisation organisation (unless otherwise specified)

2.4 Filtering of categories and topics

The categories are organised in one sheet of an excel spreadsheet, with drop down rows showing the underlying topics (see sheet “STIP topics”).

Based on the domain of interest, a category can be selected, allowing to see the specific topics (see Figures 4 and 5).

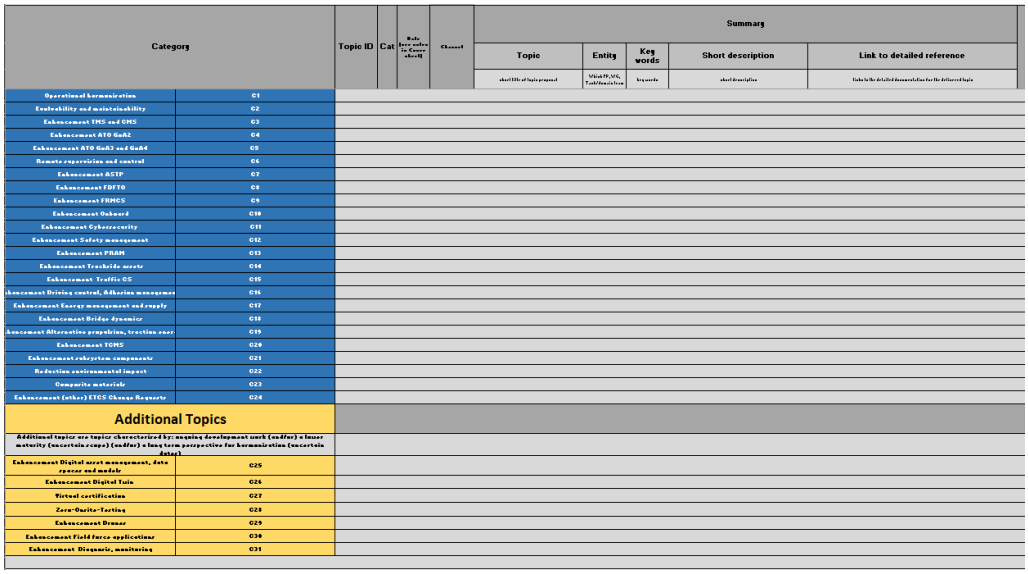


Figure 4: STIP table with 31 categories

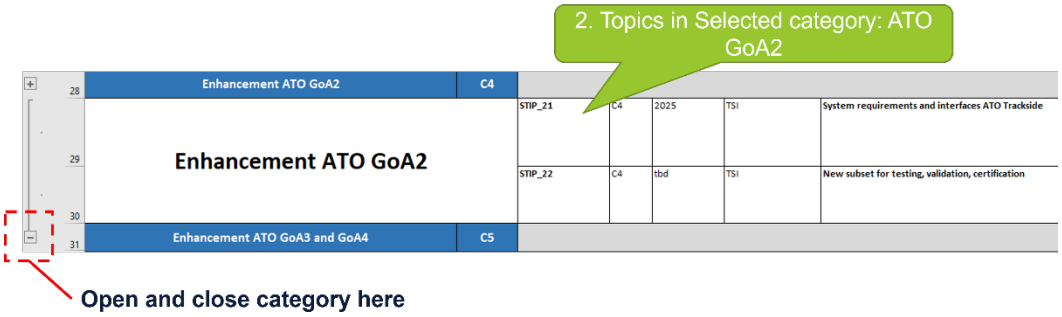


Figure 5: Specific topics within a category

For every specific topic, the main information is summarized in the “Summary” section. Detailed information delivered by the Tasks, Domains and FPs of EU-RAIL can be found in the additional columns.

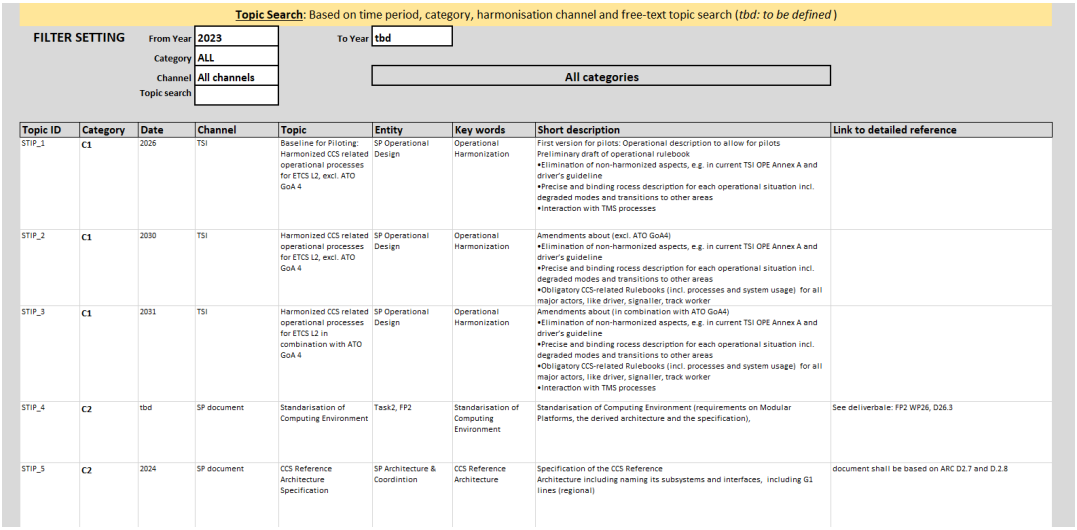
Search and filtering of the topics is available, according to:

1. **Topic category**: review and analysis of topics belonging to one domain or subsystem

2. **Harmonisation channel**: review and analysis of topics belonging to one harmonisation channel (TSI, EN standards, SP document, etc.)
3. **Time range (Years of foreseen delivery)**: Review and analysis of topics which are expected in a defined time period

For this purpose, the following filter criteria can be used on the sheet “Search + Filter” (see Figure 6):

- **Time range**: (1) From Year – To Year, (2) From Year - to be defined (tbd) [everything from start year including to be defined], (3) tbd – tbd [only to be defined topics]
- **Category**: select C1 to C26 OR all categories
- **Harmonisation channel**: select one channel OR all channels
- **Topic search**: search topic using free text



Topic Search: Based on time period, category, harmonisation channel and free-text topic search (*tbd: to be defined*)

FILTER SETTING

From Year	2023	To Year	tbd
Category	ALL		
Channel	All channels		All categories
Topic search			

Topic ID	Category	Date	Channel	Topic	Entity	Key words	Short description	Link to detailed reference
STIP_1	C1	2026	TSI	Baseline for Piloting: Harmonized CCS related operational processes for ETCS L2, excl. ATO GoA 4	SP Operational Design	Operational Harmonization	First version for pilots: Operational description to allow for pilots Preliminary draft of operational rulebook •Elimination of non-harmonized aspects, e.g. in current TSI OPE Annex A and driver's guideline •Precise and binding rocess description for each operational situation incl. degraded modes and transitions to other areas •Interaction with TMS processes	
STIP_2	C1	2030	TSI	Harmonized CCS related operational processes for ETCS L2, excl. ATO GoA 4	SP Operational Design	Operational Harmonization	Amendments about (excl. ATO GoA4) •Elimination of non-harmonized aspects, e.g. in current TSI OPE Annex A and driver's guideline •Precise and binding rocess description for each operational situation incl. degraded modes and transitions to other areas •Obligatory CCS-related Rulebooks (incl. processes and system usage) for all major actors, like driver, signaller, track worker	
STIP_3	C1	2031	TSI	Harmonized CCS related operational processes for ETCS L2 in combination with ATO GoA 4	SP Operational Design	Operational Harmonization	Amendments about (in combination with ATO GoA4) •Elimination of non-harmonized aspects, e.g. in current TSI OPE Annex A and driver's guideline •Precise and binding rocess description for each operational situation incl. degraded modes and transitions to other areas •Obligatory CCS-related Rulebooks (incl. processes and system usage) for all major actors, like driver, signaller, track worker •Interaction with TMS processes	
STIP_4	C2	tbd	SP document	Standarisation of Computing Environment	Task2, FP2	Standarisation of Computing Environment	Standarisation of Computing Environment (requirements on Modular Platforms, the derived architecture and the specification),	See deliverbale: FP2 WP26, D26.3
STIP_5	C2	2024	SP document	CCS Reference Architecture Specification	SP Architecture & Coordintion	CCS Reference Architecture	Specification of the CCS Reference Architecture including naming its subsystems and interfaces, including G1 lines (regional)	document shall be based on ARC D2.7 and D.2.8

Figure 6: Filtering interface

3 Revision process

3.1 Purpose of the revision

The first version of the Standardisation and TSI Input Plan (STIP V1.0) was published in August 2024 https://rail-research.europa.eu/wp-content/uploads/2024/08/EU-RAIL_STIP_-V1_0_Final.xlsx, aiming to facilitate the transfer of EU-Rail outcomes into the European harmonisation processes.

The STIP is a living document and shall reflect the current status of the activities and planning in Europe's Rail Joint Undertaking. In addition, in order to allow for an efficient transfer of STIP topics into harmonisation processes, the STIP needs to be closely aligned with the current planning for the TSI revision and the standardisation activities.

Therefore, the **revision of the STIP** shall provide a second, updated version.

3.2 Document detail

For the revision of the STIP V2.0 Draft by the sector the **following documents are provided**:

1. **STIP Version V2.0**

   - The STIP V2.0 includes the agreed changes and updates of V1.0 concerning the scope, timing and harmonisation channel
   - The STIP V2.0 reflects the updated STIP without highlighting track changes compared to V1.0. To see the changes, please refer to the protocol of changes (document 2)
   - To ensure traceability the numbering of specific STIP topic is not modified. New STIP items are assigned a consecutive number. The number of removed STIP items is not used any longer.
   - The STIP V2.0 includes the new column L "Topic status" to indicate relevant information about the current status of the topic with respect to the availability of budget, the maturity and alignment with other topics or the IP work

2. **Protocol of changes from STIP V1.0 to STIP V2.0**

   The protocol of changes highlights the changes from STIP V1.0 to STIP V2.0 including:

   - Agreed changes of the STIP item content (title, description) are indicated in red
   - Agreed changes of delivery dates are indicated as *previous date → new date*

- Agreed changes of harmonisation channels are indicated as *previous channel → new channel*
- If proposed changes of delivery date and/or channel were not accepted, they are indicated as *previous date → new date [note different highlight colour than agreed items].*
- Proposed new STIP item, which have been included in V2.0 following the review are indicated as **STIP 2.0 (number)**
- Proposed new STIP item, which are not included in V2.0 following the review are indicated as **STIP 2.0 not included**
- STIP items from V1.0 which are removed in V2.0 are indicated as **STIP_number deleted.** Please be aware that this can mean that the topic has been merged with another STIP item, nevertheless keeping the content of the deleted STIP item.
- STIP items from V1.0 which have been delivered are indicated as STIP_number delivered They are not included in V2.0 any longer.
- The modifications from STIP V1.0 to V2.0 are described and explained in column M "Revision"

3. **The comment resolution table**
    - For every STIP topic the comments from the sector are listed, allocation a unique identifier *COM_CAT_STIP_No*
    - The Comments are replied and the status indicated

4. **This Explanatory note**

3.3 Requirements to revised STIP topics

The STIP outlines the delivery of the harmonisation topics to the TSI CCM and the EN standardisation processes. The quality of the detailed inputs is assessed in collaboration with ERA for inputs to TSI, with EC, CEN-CENELEC and COG-Rail for inputs to EN standards.

Therefore, the maturity of the delivered STIP items for TSI and EN standards shall be in line with the expectations of:

- ERA for the pre-assessment of STIP inputs for Change Requests (CR) for the TSI revision process
- CEN-CENELEC and EC for the consideration of STIP inputs to the standardisation activities of CEN-CENELEC (standardisation request)

Coordination meetings are organised to ensure alignment with these processes.

The process for each harmonisation channel is outlined in the document EU-RAIL and harmonisation V1.0[6].

3.4 Main outcomes of the STIP revision

The main changes following the revision of STIP V1.0 concern:

General overview

- Update of timing for delivery of outcomes based on current state of progress. Changes in timing can be due to budget availability, alignment between projects, technical complexity and sector priorities
- Update of channels to ensure most adequate channel. The channel is selected considered the STIP item impact and link with regulation and standardisation
- Introduction of new topics (proposed mainly by FPs)

ATO GoA 3,4

- Currently System Pillar resources are insufficient to produce fully mature specifications for ATO GoA 3,4 within the current programme → Therefore the delivery date is changed to "after 2032". This reflects the priority assessment of the sector.
- However, ATO GoA 3,4 functionalities are still partly considered and tested in FP demonstrators (→ R2DATO)

ASTP

- Ongoing discussion on basic ASTP
- The enhancement of odometry performance is agreed
- The need to a EVC – odometry separation with specified interface is under discussion. Different variants for basic ASTP are currently assessed.

DAC

- DAC STIP items delayed but available in 2027 for 2028 TSI recommendation

To note, following a final review with DG MOVE, the following amendments have been made

- STIP N1: dissemination channel has been changed to tbd; EC asks to rely on the an EN standard as a channel. DG MOVE does not accept for the outputs to be provided as a System Pillar document, and considers that the appropriate input for the work is the standard managed by CEN TC278 WG3

[6] https://rail-research.europa.eu/wp-content/uploads/2023/08/20230604-EURAIL-and-Harmonisation_Version_1.0.pdf

- STIP 109: dissemination channel has been changed to tbd: SP doc or EN standard
- STIP 146: deleted. This is a BIM standard that is developed directly by ISO. The governance of this standard is well beyond the railway sector. Participants to the flagship project may directly contribute to this standard, but the Commission does not plan to be involved. For this reason, we suggest to delete it.
- STIP 2.0 173 – addition of “federated model approach” and addition of the TSI as channel, consistent with the Governing Board decision

Annex: STIP table

Please see associated excel spreadsheets

- EU-RAIL_STIP_ V2_0_DRAFT_FINAL
- STIP Protocol of changes STIP V1.0 to STIP V2.0 FINAL
- EU-RAIL_STIP_ V2_0_Comment_Resolution