EIM Position Paper

Brussels, May 2026

From ERTMS Fragmentation to Standardisation: EIM's Vision for an Affordable European Network

The problem

European railways face a well-known

structural paradox: despite decades of integration policy and harmonised specifications, the sector remains technically fragmented in ways that systematically inflate costs. ERTMS deployment alone is estimated at €74 to €111 billion, yet it delivers less interoperability than a truly integrated network should provide[1]. Non-standardisation is not a residual legacy issue; it is an active, compounding cost. Every "black-box" signalling system tendered today without standardised interfaces locks in years of vendor dependency, limited competition and foreclosed migration options.

Both the Copenhagen High-Level Event of November 2025 and the ERA's ERTMS Conference in April 2026 confirmed the consensus across Infrastructure Managers (IMs), Railway Undertakings (RUs), the European Commission, the EU Agency for Rail (ERA) and the supply industry: the status quo is unsustainable and a more industrial approach is required. Responsibility is shared across rail operators, the supply industry and the authorisation chain. Any credible response must engage all European stakeholders, while protecting the substantial investments early adopters of ERTMS have already made in good faith.

This Position Paper translates that diagnosis into some concrete policy proposals addressed to the EU institutions, Member States and the rail sector. It reflects the analysis of the IM community set out in **EIM's White Paper "*The Economic Burden of Non-Standardisation of ERTMS in European Railways. The EIM Vision to Reduce Costs for Infrastructure Managers*"[2],**

EIM's vision: two complementary streams

EIM's response to the economic burden of non-standardisation of ERTMS rests on two parallel and mutually reinforcing proposals:

I. **A reformed Europe's-Rail System Pillar,** embedded within the successor to Europe's Rail Joint Undertaking - on the assumption that the EU will maintain a JU structure for rail research and innovation. Under this reform, the System Pillar would be repositioned as the "coordinator of pre-deployment programmes," responsible for delivering stable, operationally validated and implementation-ready specifications.

[1] European Commission, *ERTMS – Second Work Plan of the European Coordinator*, Matthias Ruete, July 2022, p 43 and p. 45: https://transport.ec.europa.eu/system/files/2023-09/ERTMS_work_plan-second_edition.pdf

[2] The EIM White Paper "*The Economic Burden of Non-Standardisation of ERTMS in European Railways*" is available in the EIM Website: https://eimrail.org/media/other%20publications/

II. **The accelerated completion and adoption of EULYNX** as the European reference standard for the interface between central Control-Command and Signalling (CCS) equipment and field elements, securing the investments being made today while the broader "CCS+" target architecture matures.

Neither stream alone is sufficient. Together, they offer a credible and realistic path out of the non-standardisation trap.

3. Reforming the System Pillar under the Next Europe's Rail Joint Undertaking

EIM supports the sector's proposal of €18 billion for the successor of Europe's Rail JU (i.e.: €3 billion for R&I, €15 billion for pre-deployment) under the next MFF. EIM advocates its approval by the EU institutions, with the pre-deployment envelope concentrated on a small number of strategically essential CCS projects: standardised full ETCS L2 without lineside signalling; traffic management systems with standardised interfaces and coordinated FRMCS integration with ETCS.

EIM proposes that the next generation of System Pillar evolves from generic system integration to coordinating pre-deployment programmes that produce specifications ready tested for immediate deployment. This requires six specific responsibilities:

1. **Standardised architectures with updatable mandatory modular interfaces.** Once a standardised solution is available, rail operators should drop national variations and suppliers commit to a single industrial product line with a transparent upgrade path. Furthermore, where proven solutions exist in adjacent industries, rail should adopt them rather than develop bespoke equivalents.
2. **Operational rule harmonisation as a first-order deliverable.** Technical interfaces cannot be standardised if the underlying operational rules remain fragmented. The System Pillar will secure sector agreement before specifications are finalised, with resources and governance equivalent to those devoted to architectural work.
3. **Pre-deployment validation under operational conditions.** Future Europe's-Rail JU CCS deliverables will be tested before incorporation into the Technical Specifications for Interoperability (TSIs), demonstrating cross-border, multi-supplier interoperability with early ERA dialogue on authorisation. Test campaigns must be centrally defined and transparent, with dedicated financing and risk-sharing mechanisms, so that each pre-deployment testing exercise and validation serves a single European system.
4. **Implementation-ready specifications.** Specifications emerging from pre-deployment should be incorporated into TSIs without further development cycle and treated as living standards subject to managed evolution.
5. **Formal architecture methodology with transparent governance.** A reformed System Pillar must be underpinned by clear and transparent processes for requirements management, change control and business-case justification. Such governance is indispensable on two counts: it prevents fragmentation arising from optional national parameters, and it safeguards the considerable investments already made - and still to be made - by IMs, by ensuring that specification periods are stable, predictable, and accompanied by disciplined backward-compatibility rules.
6. **Brownfield migration as a first-order deliverable.** A common European framework addressing sequencing, interface management, coexistence rules, and the integration of legacy systems would be among the System Pillar's most impactful contributions.

Crucially, this framework must be developed *in parallel with* the target architecture, not as an afterthought. Embedding brownfield migration at the heart of the System Pillar's mandate is the most credible way to protect the economic value of existing infrastructure, secure the continuity of operations during the transition, and provide the long-term investment certainty that the rail sector require.

Furthermore, EIM supports the continuation of a reinforced interface with Europe's rail **High-Level Deployment Group**, or equivalent group at European level. Such group should be governed by clear and binding commitments, not just voluntary general cooperation. It should be adequately financed to run its activities effectively with the appropriate active stakeholder representation proportionate to the maturity of the work. This group should agree on coordinated or joint work programmes and synchronised deployment timeline planning. In addition, a clear escalation procedure should be set, enabling the European Commission intervention when national deviations threaten coordinated deployment.

Finally, the cooperation between System Pillar and future Innovation Pillar will be transparently defined and governed within the successor of Europe's Rail.

4. Accelerating the use of EULYNX standard

While the reformed System Pillar works toward the full CCS+ target architecture, IMs face an immediate operational reality. The mandatory deployment of radio-based ETCS across the TEN-T network goes hand in hand with the introduction of digital signalling, the most capital-intensive transformation of CCS systems in European railway history. Tenders are being launched today, and each procurement based on national specifications risks locking in another 20 to 30 years of non-standardisation.

The interface between central equipment and field elements is the single most decisive point for investment protection. The outside CCS installation and field elements represent the most capital-intensive and long-lived part of a CCS renewal: choices made today must remain valid as central equipment evolves. EULYNX has delivered a comprehensive interface specification for precisely this layer, refined through several *Plan-Do-Check-Act* cycles on operational networks. It is mature, stable and already published by Europe's Rail.

It is the natural and logical building block for the modular, standardised architecture the sector needs. However, to unlock EULYNX's full potential, the sector needs to overcome four obstacles: i) persistent national variants; ii) lack of demonstrated interchangeability between suppliers; iii) limited availability of fully compliant off-the-shelf products; and iv) insufficient governance as a true open standard.

EIM proposes a two-step path:

Step 1: Joint analysis of national variants. EIM calls on Europe's Rail, all IMs and the EULYNX community to cooperate in a transparent analysis of the existing variants, distinguishing between those reflecting genuine operational or maintenance needs (which may be integrated through tightly governed configurable parameters) and those merely preserving national habits (which should be phased out). Within these, *must-have* requirements not currently in the specification should be incorporated, while *nice-to-have* requirements should be assessed against a rigorous European business case.

Step 2: Structured process with the System Pillar and ERA towards a recognised standard. Once step 1 has produced a joint technical foundation, step 2 shall convert that foundation into a recognised European standard through a clearly sequenced, transparently governed process. The objective is twofold: to give industry and IMs the predictability needed to invest, and to ensure that the resulting specification is genuinely uniform across the European network and not a common label applied to nationally diverging products. The following sequence is proposed:

1. Endorsement of the result of the joint analysis by the System Pillar;
2. Mandate to EULYNX, with stable requirements, to complete and review the specifications within an agreed timeframe;
3. Approval of the resulting deliverable by the System Pillar;
4. Determination of the type of standard (mandatory within the TSI or voluntary) based on assessment across all relevant interfaces;
5. Publication of the standard, with legal provisions specifying that compliance cannot be claimed where the specification has been modified nationally. The right to apply the standard is granted, but not the right to change it;
6. Manufacturer compliance through self-declaration of conformity, coordinated with ERA for coherence with broader authorisation pathways.

Two further elements deserve particular attention. First, a dedicated Change Control Management process is needed to handle the residual national variability that will inevitably remain in the specification - estimated at around 10% - so that it is managed centrally and transparently rather than nationally or bilaterally. Second, robust control mechanisms must be put in place to ensure that no actor can claim compliance with EULYNX while unilaterally modifying the specification.

5. Protecting the investments already made and stability

Any credible harmonisation strategy must engage directly with the position of IMs and RUs that have committed substantial investments - in several cases billions of euros - to the current generation of ERTMS, in good faith on the basis of TSIs presented at the time as delivering a truly interoperable product. Successive specification revisions, new baselines and the migration from GSM-R to FRMCS all carry the risk that suppliers pass the cost of migrating their unharmonised product lines onto IMs and RUs through unanticipated upgrade projects.

Every harmonisation step proposed in this paper must therefore be tested against a single question: *does it protect, rather than penalise, the substantial investments already made?* A positive business case acknowledged by those who will ultimately pay must be a prerequisite for the introduction of new functionalities. Harmonisation, when accompanied by viable migration paths and, wherever technically feasible, backwards compatibility is not an incompatible objective with investment protection. They are two sides of the same commitment to a stable, coherent, industrial, financially sustainable European railway system.

6. EIM recommendations

On the basis of the analysis of the EIM White Paper and presented here, EIM calls on the European Institutions, Member States and the wider sector to act on the following coordinated agenda. In particular, EIM invites:

- **The European Commission to support** a new Europe's-Rail Joint Undertaking with pre-deployment envelope under the next EU R&I Programme. This should include financing and risk-sharing mechanism for pre-deployment activities within the operating network to test compliance with System Pillar specifications.
- **ERA to engage** early in System Pillar pre-deployment validation; support the shift from project-specific authorisations toward EU-wide cross-acceptance of standardised building blocks and explore the possibility to promote manufacturer self-declaration of conformity to EULYNX standards.
- **Next Europe's Rail Joint Undertaking to reposition** the System Pillar as coordinator of pre-deployment and treat operational rule harmonisation and brownfield migration as first-order deliverables. In addition, to strengthen the High-Level Deployment Group with clearer commitments.
- **Member States to refrain** from adding new national rules or implementation layers that recreate complexity where specifications are already harmonised.
- **Supply industry to commit** to a single target product line per supplier with transparent upgrade paths, as well as provide full cost transparency on upgrade and migration paths.
- **IM and RUs to strive** to exercise collective discipline over specifications in public tendering, as well as engage actively in the joint analysis of national variants and in the governance of the reformed System Pillar.

7. The way forward

The economic burden of non-standardisation is no longer in dispute. What Europe now needs is the collective resolve to translate that consensus into structural action. The reformed System Pillar and the accelerated standardisation of EULYNX are two sides of the same industrial response to the same fundamental problem, to be pursued in parallel and accompanied by an explicit commitment that harmonisation reinforces, rather than penalises, those who have already invested in good faith.

IM and its members stand ready to play their full part. We call on the European rail sector to commit, individually and collectively, to:

1. Exercising collective discipline in our tender specifications, so that procurement actively reinforces - rather than dilutes - European standardisation;
2. Engaging substantively in the governance of the reformed EU-Rail System Pillar and the EULYNX standardisation path;
3. Opening our networks to coordinated pre-deployment programmes under fair and transparent risk-sharing arrangements and financing; and
4. Working in partnership with the supply industry, the EU institutions and Member States to deliver an industrially robust and financially sustainable European railway system.

The time for analysis is over. The time to act together is now.

EIM, the association of European Rail Infrastructure Managers, was established in 2002 to promote the interests and views of the independent infrastructure managers in Europe. EIM's primary goal is the growth of rail traffic and the development of an open, sustainable, efficient and customer-oriented rail network in Europe. For further information, please consult www.eimrail.org. Contact: bardo.schettini@eimrail.org