UNIFE Vision Paper on the Evolution of Regulation, Standardisation and Innovation for a Competitive European Rail Supply Industry

18 October 2022

Executive Summary and UNIFE's Vision

The EU aims to increase the market share of railways and to create a Single European Railway Area. These goals are an important contribution to the European Green Deal which sets ambitious targets for reducing transport emissions in the EU. To achieve them the European Union utilises the common technical framework at its disposal by developing the applicable regulations, standards and supporting research & innovation programmes. However, based on recent experience the European rail supply industry is concerned that we are moving away from achieving an efficient technical framework and our shared goal of increasing the competitiveness and market share of rail transport supporting the European Green Deal. The purpose of this vision paper is therefore to highlight the challenges faced by the European rail supply industry in the areas of regulation, standardisation and research & innovation stemming from the continuous development of this technical framework and to explain our vision for how to ensure its balanced, streamlined and stable evolution.

UNIFE's Vision - A competitive European railway system needs:

- a long-term roadmap ensuring a stable and predictable evolution of regulation and standards aligned together with the European Commission, European Union Agency for Railways and the sector
- a technical framework containing an optimised level of detail in regulation and a lean interface to standardisation, ensuring interoperability and safety but without impeding innovation
- an equal level of maturity and implementation reached between the different Technical Specifications for Interoperability
- European leadership in international railway standardisation
- European Research & Innovation which supports the development of an efficient technical regulation and standardisation framework in line with the envisaged long-term roadmap

Introduction and Problem Statement

The European Green Deal presented in December 2019 sets out a clear vision of how to achieve climate neutrality in Europe by 2050, including a targeted 90% reduction in European transport GHG emissions. The European Commission's 'Sustainable and Smart Mobility Strategy'[1] and 'Action plan to boost long distance and cross-border passenger rail'[2] further outline concrete objectives and milestones towards the digitalisation and greening of the transport sector with specific initiatives for the railways, in part by inspiring a modal shift to rail. It is clear that achieving the European Green Deal targets is only possible by attracting more end-users (passengers and freight) to the railway system which therefore needs to become more efficient, attractive and competitive. The railway system needs to establish itself as the backbone of tomorrow's green, multimodal transport system for passenger and freight customers.

In the context of these overarching policy objectives, the European Institutions set ambitious targets for the railways sector, for example by the doubling of rail freight traffic and tripling of high-speed rail by 2050. To achieve these, the European Union utilises the common technical framework at its disposal – namely the applicable regulations (notably the Interoperability Directive and its Technical Specifications for Interoperability (TSIs) as well as the TEN-T Regulation) and European and International Standardisation – and supported by European Research & Innovation programmes in steering the gradual harmonisation of the railway system towards achieving a Single European Railway Area (SERA). The European rail supply industry fully recognises the value in achieving a SERA and supports the goal of a safe, interoperable and connected modern European railway system with unified interfaces, designed according to a single set of functional requirements and performance specifications to increase European harmonisation and remove the fragmented national approaches.

However, it must be acknowledged that the maintenance and development of the European technical framework (both technical regulations and standards) is an intricate task and takes significant efforts and resources from both the European Institutions and the rail sector. We must also frame this task against the wider context and fierce competition being experienced on the international stage which further challenges Europe's rail supply industry's market access and leadership. Initiatives taken in Europe must take into consideration the wider picture and support the European rail supply industry to thrive both at home and internationally: transport policy and industrial policy must be intertwined. The limited human resources in the European rail sector must be used as efficiently as possible in order to achieve this. This was

[1] https://transport.ec.europa.eu/transport-themes/mobility-strategy_en
[2] https://transport.ec.europa.eu/news/action-plan-boost-passenger-rail-2021-12-14_en

acknowledged both by the European Commission and the European Rail Supply Industry in the report of the expert group on the competitiveness of the European rail supply industry[3] published in October 2019. The scope and frequency of changes to this already complex technical framework also present significant challenges and industrial risk for the European rail supply industry where regulatory changes are not aligned with the contractual development, delivery and product life-cycle timelines. This current regulatory instability creates serious risks on the economic viability of long-term investments in the sector.

The European rail supply industry is concerned that we are moving away from achieving an efficient technical framework and our shared goal of increasing the competitiveness and market share of rail transport supporting the European Green Deal. The follow chapters of this vision paper highlight the challenges faced by the European rail supply industry in the areas of regulation, standardisation and research & innovation stemming from the continuous development of this technical framework and to explain our vision for how to ensure its balanced, streamlined and stable evolution.

Regulation – TSIs fit for the future

Optimising the TSI content and performance

Increasing technical and operational interoperability of the different national rail networks across the EU has been a key objective of Europe's transport policy since the mid-1990s. To achieve this, the European Union has developed a common technical framework, primarily via the Interoperability Directive (EU) 2016/797 and supporting TSIs as the key tools in driving the gradual harmonisation of the railway systems.

The establishment of the TSIs makes railways somewhat of an outlier in comparison to the other 'new approach' directives by requiring this intermediary layer of regulation to fulfil the essential requirements of the directive, rather than relying on the application of voluntary harmonised standards. Nonetheless, the TSIs are accepted as a necessary part of the framework due to the historical situation of diverging and fragmented national railways. The exact level of content however still needs to be carefully considered to ensure the essential requirements are met and optimal level of harmonisation achieved for interoperability and safety, but without regulating where unnecessary. Every additional requirement in the TSI results in additional checks by third party assessors and authorities, resulting in additional rigidity, efforts in authorisations and cost to the products. Furthermore, regulatory requirements take years to be delivered and could hinder innovation if they do not remain limited to functional requirements. Therefore, the TSIs must become as streamlined as possible to facilitate both their application within Europe and their potential to be exported as a global reference.

The SERA cannot be achieved solely with regulation and reaching a SERA does not mean implementing identical products. To avoid the risk of hindering market mechanisms enabling innovation, UNIFE calls for a set of TSIs without product descriptions and over prescribing aspects derived from EC policy objectives.

Improving the maturity across TSI subsystems

The European Commission's 'Connecting Europe Express' initiative as part of the European Year of Rail 2021 demonstrated many of the technical and operational barriers remaining, which continue to hinder cross-border traffic and increase costs to the sector. In this context, UNIFE fully supports the acceleration of the ERTMS roll-out and removal of legacy (Class B) signalling systems, as proposed in the revision of the TEN-T Regulation.

Due to the extensive efforts undertaken in the past decades, the European rail supply industry is convinced that today's rolling stock TSIs (including control-command and signalling (CCS) on-board) have reached a maturity level that the entire rail sector can be confident in and that provide a stable ground for a safe and interoperable rail target system, fulfilling the core scope of the TSIs. In addition, the rolling stock TSIs have implemented defined targets to be reached by new rolling stock and a common transition regime that will be further harmonised in the 2022 TSI revision. The infrastructure, energy and operations TSIs however, lack the similar level of maturity and clarity on targets and transition regimes. We consider there is a current imbalance in the scopes and level of implementation of the different TSIs which until addressed will continue to result in practical barriers to cross-border services and reaching the SERA, even for TSI compliant rolling stock. A clear example of this imbalance is seen with the current CCS TSI complexity, caused largely due to lack of maturity and operational harmonisation in the OPE TSI resulting in a number of different interpretations impacting the design. Future

[3] https://ec.europa.eu/docsroom/documents/37829

functions such as automatic train operation (ATO) grade of automation (GoA) 3/4 can only be done efficiently with harmonised operational rules agreed from the start. Interoperability has until now mainly consisted in adding European and national requirements that have to be met by signalling systems and rolling stock, driving up technical complexity. Further major efficiency gains will be realised only on the basis of common functional requirements and harmonised operational rules.

Cleaning-up of National Rules

In addition, UNIFE supports the EC and ERA continuing and finalising the work with Member States on the clean-up, harmonisation and/or elimination of national technical, safety and operating rules. This task remains a pre-requisite for the simplification of the European technical framework. The outputs of the System Pillar of the Europe's Rail Joint Undertaking shall further facilitate the national rule clean-up, notably regarding the harmonisation of operation rules. However, progress in the National Technical rule clean-up programme under the Fourth Railway Package has stalled in the recent years and stronger cooperation and enforcement of this principle is needed on European and National levels in order to achieve a simplified vehicle authorisation system in Europe. At European level, further upgrade and convergence of rail infrastructure to become TSI compliant is necessary before we can reach a unique way of working allowing us to remove all remaining National technical rules. How best to promote this in a timely manner by combining regulation and EU funding needs to be considered.

Providing sufficient stability for projects

It is widely acknowledged within the sector and EU institutions[4] that the regulatory framework at EU and national level is highly complex and diverse with different starting points in the Member States. As a result, future European Union legislative proposals should be based on careful analysis of the current state of play and economic impact and should also aim at simplification wherever possible. The rail sector is an industry with long timescales: tendering processes can last one to two years, project execution anywhere between four and ten years and assets are expected to have a life cycle of thirty years or more.

As a general rule, the rail sector needs predictability and transparency of the applicable requirements in order to successfully design, develop and deliver vehicle products to the market using the standard long-term contracts applicable in the railway sector, to minimise industrial risk and to guarantee the investment of all stakeholders for the projects already signed and calculated. Only as an exceptional case of a major critical safety issue should new requirements invalidate a vehicle design and require mandatory modifications to existing vehicle designs and/or vehicles/infrastructure in operation. Standard layering approach should be consider to add new services; functions without hindering the first standardized part.

Unfortunately, adapting an existing, authorised vehicle design to a new TSI baseline, has inadvertently become a frequent occurrence in recent years where the regulations have introduced new technical requirements without sufficient transitions, e.g. Regulation (EU) 2018/868 provisions on energy measuring system and data collecting system. These unexpected modifications have generated significant extra costs on the sector and avoidable delays for ongoing products and contracts, often without practical benefit or value for the customers and end users compared to the original vehicle design, already demonstrated to be safe and interoperable. Mandatory and retroactive changes to technical requirements have a negative impact on bids, product development programmes, and delivery schedules, with one-off and recurring costs and increased risk of severe delay penalties. These have the potential to undermine the business case for railway projects. The frequency of regulation changes and insufficient transitional arrangements also leads to unnecessary fleet diversity for railway undertakings and maintainers resulting in extra costs and efforts and decreased operational flexibility.

By controlling the frequency of regulation changes and ensuring sufficient transitional arrangements, stability for contracts and projects can be achieved while at the same time providing the openness and the flexibility required to facilitate innovation uptake in accordance with the needs of the market. In this regard, regulatory stability does not mean freezing the development of the regulations and technical progress but predictability and transparency for the sector. UNIFE expects that the System Pillar of the Europe's Rail Joint Undertaking will maintain a global Model Based System Architecture and consequently allow a better predictability and transparency for the sector. This will allow for better control of the frequency of regulation changes.

[4] Council conclusions 3 June 2021 on "Putting Rail at the Forefront of Smart and Sustainable Mobility"

TSI Planning - Revision Package 2022 and beyond

UNIFE recognises the benefits of the new TSI transitions model introduced by the 2022 Digital rail and Green freight TSI Revision package, in particular the unlimited validity of EC Type certificates. However, newly introduced requirements with high impact on projects need to remain the exception and must be determined according to a clear and duly justified process predefined in the TSI transitions rules so as to ensure minimal disruption. The process must include an economic impact assessment based on a complete cost-benefit analysis of the proposed change, including an agreed corresponding EU funding/compensation mechanism regarding cost and time and the establishment of an implementation plan.

During the past three years of TSI revision process we have also seen other rail stakeholders requesting additional TSI requirements going beyond interoperability and safety. Such requirements have to be managed very carefully, avoiding in general market regulations, but allowing voluntary standards in justified cases. Frankly, we consider it a misguided use of regulations to increase the existing complexity and rigidity and harm the sector in the long-term. The future TSI Change Control Management (CCM) process has to ensure that TSI change requests by stakeholders do not result in inflated TSI requirements going beyond interoperability and safety. Before accepting any change request it should be considered whether the topic can be addressed with priority through standardisation. UNIFE counts on ERA to reject TSI change requests going beyond interoperability and safety.

Following the 2022 TSI Package, the European rail supply industry requires and expects longer stable periods between further TSI revision packages. UNIFE consider 5-7 years between larger TSI Package revisions necessary to support stable project delivery and minimise impact on ongoing or existing vehicle authorisations. We recognise that few items will need more detail in regulations sooner, e.g. the introduction of the Digital Automatic Coupler (DAC) and Future Railway Mobile Communication System (FRMCS) specifications once mature and updates to the referenced standards. For this, intermediate targeted updates to the TSI texts and standards appendixes should be considered, however the scope should be strictly limited and not open to uncontrolled change requests. Better strategic alignment is needed by all stakeholder to achieve the best long-term output for the railway sector.

Regulation - recommendations to reach UNIFE's vision:

- Establish a long-term roadmap ensuring a stable evolution of TSI and standards aligned together with the European Commission, European Union Agency for Railways and the sector to provide predictability and minimise the frequency of project changes and fleet diversity
- The content of the TSIs should be reviewed and streamlined where possible to facilitate its implementation in Europe and uptake as a global reference
- The maturity and implementation levels of the TSIs related to infrastructure, energy and operations should be enhanced to match those of the TSIs regarding rolling stock, including the further harmonisation and/or elimination of national technical, safety and operational rules
- Implement sufficient TSI transition rules which ensure newly introduced requirements and technologies with a high impact on projects remain the exception and running contracts are protected from unexpected costs
- If changes impacting ongoing projects are considered, proceed only on the basis of a robust economic impact analysis and provide support to mitigate the extra costs created by such changes

Standardisation – ensuring efficient leadership in Europe and Globally

European Standardisation and its interface to Regulation

European Standards play an important role in the technical framework governing the rail sector in the EU. Besides EU harmonised standards that provide presumption of conformity to the EU law while remaining voluntary, many standards in the rail sector are directly referenced by the TSIs, effectively making them - or certain provisions within them – mandatory in the application of the TSI. This peculiarity in the rail sector with its intermediary TSI regulation layer adds a benefit in terms of harmonisation in the EU, but also a high cost in terms of added rigidity to the wider framework and inflexibility in the application of standards during projects.

For the 2022 TSI Package extensive work has been carried out by the European Union Agency for Railways and sector experts to update the list of referenced standards, over 75% of which had become outdated since their dated reference in the TSI. This work has highlighted the complexity of the interface between the TSIs and referenced standards and the difficulty in maintaining a lean system when their developments are based on different models with independent timelines

and drafting arrangements. More must be done to improve and streamline the interface between regulation and standardisation including a more timely and flexible update process. Overall the number of referenced standards should be reduced significantly to lower complexity. The Sector Forum Rail has developed and introduced to the agency a "decision tree" (shown in Annex I) which makes clear in which cases a standard should become harmonised or directly referenced in the legislation. This method should be put into practice immediately after the 2022 TSI revision.

Within the signalling domain, the CCS TSI Appendix A largely references a set of mandatory ERTMS Specifications (often called the CCS Subsets) rather than standards developed by the recognised standardisation organisation. However, the same principles apply whereby the reference to these technical specifications in the CCS TSI make their application mandatory within the regulation and therefore subject to checks by third party assessors. As such, further consideration is also needed here regarding the content of the different ERTMS Specifications and the nature of their application. A clear distinction is needed between mandatory requirements necessary for interoperability and safety, and thereby subject to assessment, and other requirements which remain voluntary and outside the scope of assessment and considered to be contractual. Reviewing the CCS TSI and its ERTMS Specifications in this way would help ensure optimised content of the TSI and balancing the needs of stability, flexibility and innovation.

International Standardisation and its importance for global competitiveness

UNIFE has previously highlighted the strategic importance of standards, a fact that has recently been recognised in the European Commission's Strategy on Standardisation[5] which states "European standardisation operates within an increasingly competitive global context… the strategic importance of standards has not been adequately recognised at the cost of EU leadership in standards-setting. This must change." In recent years Europe's position of leadership in international standardisation has been under increasing pressure as other non-EU countries have noticeably expanded their efforts and resources to influence the content of work items and take over leading roles in committees and working groups at the international standardisation bodies as they have recognized the strategic importance of standardisation.
Clearly the timing of these activities and opportunity for the European rail sector to lead and influence the results is at stake. On the one-hand we need to ensure a mature and streamlined European technical framework, on the other hand we cannot wait for this to be completed before offering content on the international stage. A holistic view considering the objectives and intentions in Europe and globally is needed while also considering the scarce resources available to undertake these parallel tasks in the most efficient manner. Initiatives in Europe and internationally must complement each other and cannot come at the detriment of one or the other.

Standardisation - recommendations to reach UNIFE's vision:

- Review and minimise the references between TSI and standards with more emphasis placed on the use of harmonised standards. The principle should be to first consider if harmonisation of the standard is necessary and then only where explicitly needed to reference it in the TSI. Reducing the web of referenced standards will allow the market to evolve quicker to state of the art standards and innovations, based on voluntary market driven application
- Review the content and nature of application of the different CCS TSI Appendix A ERTMS Specifications to ensure an optimised functioning of the CCS TSI
- Implement a system where more frequent updates to the TSI referenced standards appendices are made available every 12-18 Months to provide timely availability of the latest standards in between TSI packages, including the flexibility of choice standards referenced
- European rail stakeholders must work together for a stronger coordinated European voice globally regarding international standardisation
- With a sense of urgency, the respective European Standardisation Organisations' Technical Committees need to monitor and take into consideration relevant standardisation activities at ISO/IEC level and make a strategic assessment with regard to the decision on whether and when to propose standardisation projects at European or directly at international (ISO/IEC) level
- European rail stakeholders, together with the European Institutions, must consider initiatives, timing, and resources on a holistic level and where identified pre-empt new work item proposals at international standardisation level to retain global leadership of the European rail sector

[5] An EU Strategy on Standardisation - Setting global standards in support of a resilient, green and digital EU single market - Brussels, 2.2.2022, COM(2022) 31 final

Research & Innovation – developing the rail system of the future

Europe's Rail Joint Undertaking

Staying at the forefront of Research & Innovation (R&I) is a key factor for Europe and European rail supply industry to compete globally as highlighted in the report of the expert group on the competitiveness of the European rail supply industry[6]. The setting-up of the Europe's Rail Joint Undertaking (ERJU), the successor of the Shift2Rail Joint Undertaking, has been a priority for UNIFE and the rail sector in order to continue the excellent cooperation between rail stakeholders established in Shift2Rail but also to focus on the delivery of new services, solutions and technologies identified as key priorities by the European Rail Research Advisory Council (ERRAC) Strategic Research Agenda (SRIA)[7]. Europe's Rail with its Innovation and System Pillars will play a pivotal role in developing the green and digital transformation of the European rail system. The Innovation Pillar will focus on R&I activities on topics like for instance ATO, Traffic Management System (TMS), Digital Twin, Asset Management, Energy efficiency and DAC. The System Pillar will ensure a coordinated approach with the sector for the overall evolution of the railway systems and the associated technical framework.

Focusing on the European CCS system, the vision of the Europe's Rail System Pillar shall be simple: One European CCS System with harmonization of operations based on ERTMS level 2 and above, delivering a competitive SERA, consistent with rail sector's common business objectives, considering existing legacy architectures and an agreed implementation roadmap towards a future target architecture.

UNIFE acknowledges the formal role the Europe's Rail System Pillar will play in delivering inputs to TSIs and harmonised standards via a strategic 'Standardisation and TSI Input Plan' envisaged to facilitate the market uptake towards digitalisation and automation. Europe's Rail has the general objective to "support the development of a strong and globally competitive European rail industry".[8] As such, the Standardisation and TSI Input Plan must provide careful consideration and coordination between the mandatory regulation or voluntary standardisation domains and whether to lead certain initiatives at the European or International level. The preference should be for voluntary harmonized standards over mandatory reference of a standard. For Standardisation, the international level should be the first consideration.

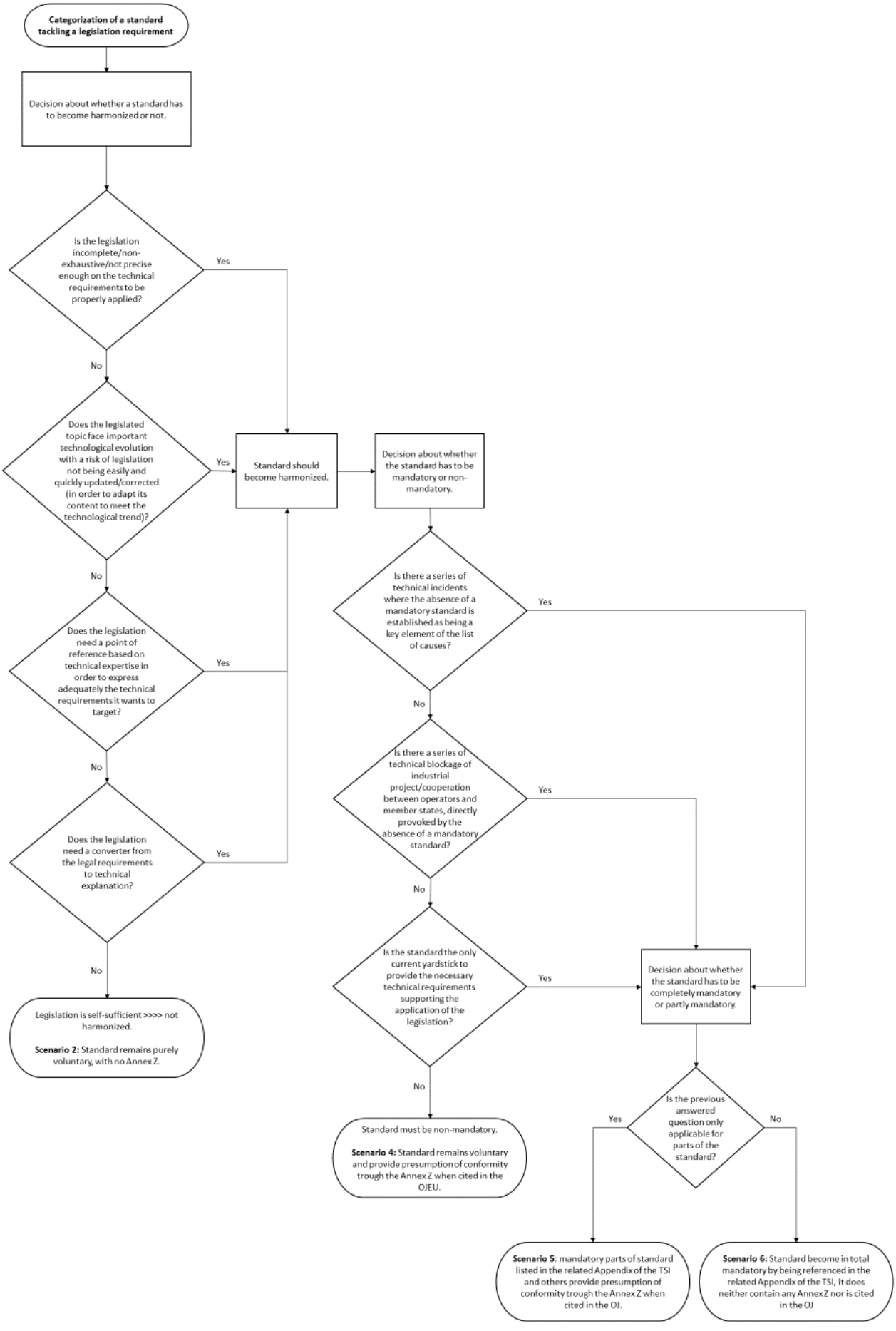
In order to feed into TSIs and harmonised standards, the outputs of Europe's Rail need to be of high quality and demonstrate market readiness. UNIFE underlines that innovation cannot be directly introduced to market by regulation. Innovations must first be matured and demonstrated before a ready product can be implemented on the market. Here we find a big difference of the railway system to purely consumer driven markets as for example mobile communication. As such, the expected outputs of Europe's Rail which can go directly into regulation and/or standardisation are yet to be determined. Only once mature, regulations and standards can be considered as a potential channel for research results. The European rail supply industry believes innovation is primarily driven by the needs of the market. Regulation and standardisation is there to enable this but should not be the driving force in mandating specific innovations.

Research & Innovation - recommendations to reach UNIFE's vision:

- Carefully coordinate the outputs of the ERJU System Pillar's Standardisation and TSI Input Plan to support a lean and efficient EU Technical Framework and its long-term development roadmap
- Consider how mature ERJU outputs can best serve European and/or International standardisation activities to have the greatest long-term impact via cooperation between the ERJU and European and International Standardisation Organisations
- Europe's Rail to deliver a rail system architecture endorsed by the rail sector, harmonise operational rules and define a migration plan aligned with the long-term development roadmap

[6] https://ec.europa.eu/docsroom/documents/37829
[7] https://errac.org/publications/rail-strategic-research-and-innovation-agenda-december-2020/
[8] Council Regulation (EU) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe ('Single Basic Act')

Annex 1 – Sector Forum Rail Standardisation Decision Tree



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