

Measure 9: Updating the interoperability directives on high-speed and conventional railway networks

First page:

<p><i>Policy package:</i> 2A: Rail liberalisation and harmonisation</p>
<p><i>Measure 9:</i> Updating the interoperability directives on high-speed and conventional railway networks</p>
<p><i>What is the problem being addressed ?</i></p> <p>One task of the Community is to contribute to the establishment and development of trans-European networks in the area of transport. One important item to be addressed here is the interoperability of the networks, particularly in the field of technical standardisation. By revitalising the railways sector through an improved interoperability, the measure should also encourage a switch to more efficient and cleaner forms of transport including better organisation and logistics, as required by the 6th Community Environment Action Programme. Concerning noise pollution, Directive 2002/49/EC on environmental noise invites the Member States to adopt action plans to reduce or limit the noise of the transport infrastructures. Interoperability issues are dealt with separately for High-Speed and conventional rail:</p> <ul style="list-style-type: none">• <u>High-speed railway networks:</u> to address this issue the Council has adopted, on 23 July 1996, the Directive 96/48/EC on the interoperability of the trans-European high-speed rail system. The European Association for Railway Interoperability (AEIF), acting as joint representative body in the directive, has drawn up technical specification for interoperability (TSIs), which were adopted by the Commission in 2002, by bringing together representatives of the infrastructure managers, railway companies and industries. To prepare the TSIs, and to guide the technical choices made in projects in progress, the Commission has adopted two instruments: Decision 2001/260/EC on the characteristics of the ERTMS¹ system and Recommendation 2001/290/EC on the basic parameters of the trans-European high-speed rail system. The current decision is made to ensure that, from 2002 onwards, new high-speed lines and upgraded lines can be built to the new interoperable standards. This decision is paving the way for the realisation of the high-speed railway priority projects, proposed by the Commission in October 2003 (COM(2003) 564 final), to the new interoperable standards.• <u>Conventional railway networks:</u> Community procedures for the preparation and adoption of TSIs and common rules for assessing conformity to these specifications are introduced in Directive 2001/16/EC adopted on 19 March 2001. The directive is setting up a first group of priority TSIs to be adopted within three years, i.e. in 2004, in specific areas. <p>After a number of lessons have been learned from the work on developing TSIs in the high-speed sector, the application of the directive to specific projects and the work of the Committee under Article 21 of Directive 96/48/EC, the Commission has proposed changes to the two rail interoperability directives with a proposal of amendment included in the 2nd Railway Package.</p>
<p><i>Measure's costs and benefits:</i></p> <p>The (supplementary) costs of building the new high-speed lines and upgraded lines to the new interoperable standards shall be estimated by project. The benefits shall be estimated by taking into consideration the advantages offered by the new/upgraded railway line, realised at interoperable standards, compared with the situation when interoperability was not ensured. The economic effects will take place at the level of investment and creation of new business, at the level of employment and of the business competitiveness.</p>
<p><i>Legislative implementation at the EU level:</i></p> <p>An initial measure towards ensuring interoperability of trans-European rail networks was taken by the Council in 1996 when it adopted Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system. The aim of this Directive was to achieve the interoperability of the European high-speed train network at the various stages of its design, construction, gradual placing in service and operation. Subsequently, the Council adopted Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional</p>

¹ European Rail Traffic Management System

rail system. The objective of this Directive was to achieve the interoperability of the trans-European conventional rail system. Directive 2001/16/EC is structured and linked closely to Directive 96/48/EC. Following the EU Transport White Paper in 2001, the 2nd railway package was proposed by the Commission in January 2002, COM(2002) 18 Final. Amongst other things, the 2nd railway package contained a proposal for enhancing the interoperability principles, amending the existing Directives 96/48/EC and 2001/16/EC.

What are the objectives ?

The Commission has adopted the report on the implementation and effects of Directive 96/48/EC [COM(1999) 414] on 10 September 1999. This report gave a first assessment of the progress made in achieving the interoperability of the trans-European high-speed rail system.

The development of the **European High Speed Rail network**, originating with the TGV Sud Est in 1981, has been important. As of 2001, the European High Speed Rail network (lines capable of speeds of 250 km/h or more) consists of 2,614 km, with a further 2,238 km under construction (Source: European Union Energy and Transport in Figures 2002). High Speed Rail traffic (including tilting trains) in the European Union has increased from 21.6 billion passenger kms in 1991 to 65.4 billion passenger kms in 2001, now accounting for some 20% of national rail travel (UIC, 2002). INTRAPLAN/INRETS forecast that by 2010 high speed rail usage will have increased to 166 billion passenger kms. Table A2.2 provides information about demand levels for High Speed Rail. Although initially based on national networks (e.g. TGV, ICE, X2000, AVE), international networks have evolved including the Thalys, Eurostar, Linx and Cisalpino networks. Further international networks are planned, including the Rhealys services that will make use of the new TGV-Est line. The period 2010 to 2020 is expected to see further developments particularly for Transalpine traffic, for the Nordic triangle and in the Iberian peninsular, whilst there are also expected to be major upgrades in central and eastern Europe. This has been confirmed in the recent report from the High-Level Group on the trans-European transport (TEN-T) network (High Level Group, on the trans-European transport Network, 2003).

High Speed Rail Travel 1990-2002 (1000 mio pkm)

	B	D	E	F	I	NL	FIN	S	UK	EU15
1990	-	-	-	14.9	0.3	-	-	-	-	15.2
1991	-	2.0	-	17.9	0.4	-	-	0.1	-	20.4
1992	-	5.2	0.4	19.0	0.4	-	-	0.2	-	25.2
1993	-	7.0	0.9	18.9	0.5	-	-	0.3	-	27.6
1994	-	8.2	0.9	20.5	0.8	-	-	0.3	n.a	30.7
1995	-	8.7	1.2	21.4	1.1	-	-	0.5	n.a	32.9
1996	-	8.9	1.1	24.8	1.3	-	-	1.1	n.a	37.2
1997	0.6	10.1	1.3	27.6	2.4	-	0.1	1.3	n.a	43.4
1998	0.8	10.2	1.5	30.6	3.6	0.1	0.1	1.6	n.a	48.5
1999	0.8	11.6	1.7	32.2	4.5	0.1	0.1	1.8	n.a	52.8
2000	0.9	13.9	1.8	34.7	5.1	0.1	0.1	2.1	n.a	58.7
2001	0.9	15.5	2.4	37.4	6.8	0.1	0.1	2.1	n.a	65.3
2002	0.9	15.3	2.5	39.9	7.5	0.1	0.1	2.3	n.a	68.6

Source: UIC – Union International des Chemins des Fer.

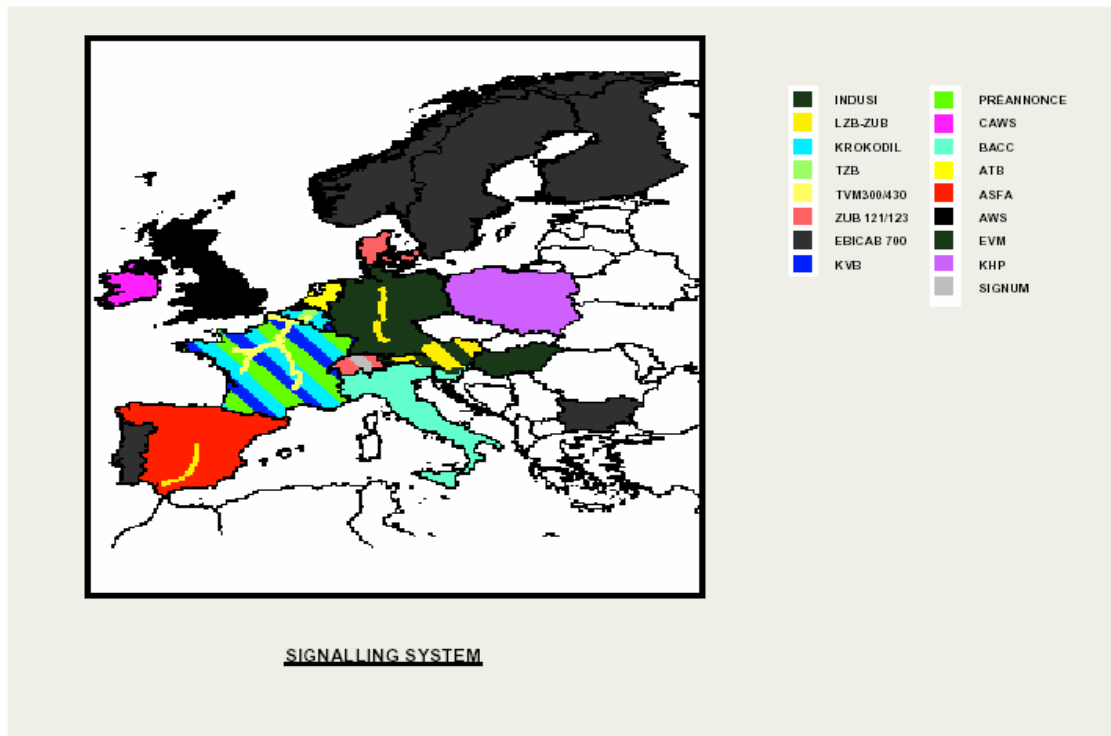
However, it is important to note that not all existing HST lines are interoperable. Because the network continues to develop, with a series of new services expected to be introduced in the next years, the process of putting interoperability in action must be speeded up by taking measures on three fronts:

- coordinate investments by different Member States in cross-border projects more closely: the return on such projects is obviously greater if the full capacity of the infrastructure can be used as soon as it is brought into service;
- apply the TSI before they are published to major maintenance work and renewal of high-speed lines already in service;
- provide financial support for application of the TSI from the budget for trans-European networks.

As it concerns the **conventional rail system**, the main technical and interoperability barriers include: different track gauges (e.g. for Spain and Portugal); differences in signalling systems (see figure below); different electricity systems (for example, Netherlands, Austria, Germany and Switzerland 15 kV, Italy,

Slovenia and Czech Republic 3 kV and Slovakia 25 kV); different train protection systems. Some of these differences would take considerable time and investment to be removed even if the necessary development programmes were defined and begun immediately on implementation of the EU Directives on interoperability.

DIFFERENT SIGNALLING SYSTEMS IN EUROPE



Source: UNIFE

Interactions with other WP measures

There is a strong connection with the measure 12 concerning the gradual opening-up of international passenger services, by ensuring the achievement of a interoperable high-speed system and thus the operational conditions for opening-up the international passenger services.

Moreover, up-dating directives on interoperability on high-speed and conventional railways networks will allow the development of proper rail services on the new and/or up-graded rail infrastructure to be considered in the Eliminating Bottlenecks perspective (see Measure 44). The border-crossing high-speed rail TEN priority projects are also aiming to improving interoperability of the high-speed system in Europe. Freight railways projects proposed as TEN priority projects are contributing to the improvement of the interoperability of the conventional railways networks by taking into account the requirements of the systems in the project definition / design phase.

Second page:

Output indicators:

Although there are no direct and synthetic indicators for interoperability, differences in gauge, electricity and common and command systems can be assessed and reflected by indicators. The Council Directive 96/48/EC provides certain standards for high-speed railways, which can be expressed as % of the total network. Another example could be the percentage of international services operated under more than one electricity/safety system. The Steer Davies Gleave 2004 Study on Extended Impact Assessment of rail liberalisation shows the following technical characteristics of conventional rail systems in four case study countries:

	Germany	Hungary	Spain ⁵	Sweden
Track km	36,040	7,949	13,869	10,920
Gauge (mm)	1,435	1,435	1,668	1,435
Single track (%)	51	84	75	82
Electrified track (%)	53	35	54	74
Electrification voltage	15kV, 16.67Hz	25kV, 50Hz	3kV DC	15kV, 16.67Hz
Rolling stock fleet	Locomotives	7,112	1,098	948
	Carriages	21,139	3,232	4,262
	Powered carriages	2,402	340	1,003

Source: UIC

The table highlights the range of systems operated across Europe, particularly in respect of electrification voltage. Germany and Sweden are two out of only five countries among the 25 covered by this study to use 15 kV, 16,67 Hz system, the other being Austria, Norway and Switzerland. The 25 kV, 50 Hz system used in Hungary appears more common, particularly in Central and Eastern Europe, and is also used in Denmark, France and the UK. The technical characteristics of Spain are almost unique. The table shows that the proportion of electrified lines is substantial in at least three out of the four countries, highlighting the importance of differences in electrification voltage as a barrier to interoperability. The countries are also substantially different in terms of the size of their respective rolling stock fleets. The size of Germany's fleet, which is the largest in Europe, might provide the basis for an active market, but the scope for deploying such rolling stock outside Germany, other than in neighbouring countries, is likely to be variable and in many cases limited by interoperability problems. However, locomotives are increasingly interoperable as increasingly they are able to run on different networks with different electricity systems, control and command and even gauge.

This analysis suggest that the following indicators can be used to monitor the progress of interoperability:

- Proportion of electrified lines (these may cause possible problems if there is different electrification voltage from country to country).
- Length of conventional rail network becoming interoperable as a result of implementing the interoperable standards (but currently this indicator tends to coincide with national networks).
- Time needed at borders/terminals to adjust profiles and gauges
- Time needed at borders/terminals to change locomotives and rolling stock
- Number of projects addressing the high-speed railway system and the conventional railways built to the interoperable standards (after 2002).
- Number of kms becoming interoperable as a result of implementing the interoperable standards in the new projects. The following table shows the anticipated results of the major railways projects identified in the UIC 2002 study in terms of **annual average km of new and upgraded line**:

Country	1999-2010			1999-2020		
	New lines	Upgraded lines	Total	New lines	Upgraded lines	Total
Austria	22	38	60	18	55	72
Belgium	10	8	18	5	4	9
Denmark	1	22	23	1	22	23
France	102	16	119	123	24	147
Finland	7	61	68	4	80	84
Germany	56	108	163	54	127	181
Greece	0	46	46	9	58	67
Ireland	0	0	0	0	17	17
Italy	92	60	151	51	136	187
Luxembourg	0	1	1	0	1	1
Netherlands	13	14	26	9	7	16
Norway	0	2	2	0	76	76
Portugal	0	0	0	18	0	18
Spain	161	17	177	104	92	196
Sweden	17	95	112	41	55	95
Switzerland	10	2	12	15	16	31
United Kingdom	8	70	79	4	41	45
Central and Eastern Europe	1	43	44	1	476	477
Total	500	602	1,102	455	1,286	1,741

Source: Intraplan

A useful source of data is the database developed under the DGTREN-PLANCO Study on TEN-T network infrastructure, described in Measure 44 of this report. This database provides for the railway network, amongst other things, the following technical parameters for each TEN-T link: the type of traction and if electric the voltage, the number of tracks and the track gauge, the minimum loading gauge and the maximum axle load, the maximum speed and length of the train, the type of command/control system in use.

Outcome indicators: intermediate impacts on transport markets

Technical differences between national rail systems will continue to limit the scope for developing cross border services and international procurement of standardised equipment helping to drive down rolling stock unit costs. This represents a barrier to competition: no potential competitor, whether an established national operator pursuing new market opportunities or an independent new entrant seeking to exploit new market opportunities, could systematically secure rolling stock at a substantially lower cost than an incumbent, although this could occur in some situations. The technical constraints on interoperability of rolling stock, coupled with economies of scale in procurement, typically mean that the incumbent can often obtain rolling stock at close to the lowest available price.

By their nature, these differences can only be removed through substantial investment directed towards greater harmonisation, in line with the Directive covering interoperability. Gains in production efficiency (and by implication, price reductions) could be secured through greater harmonisation of standards for rolling stock, signalling and track infrastructure – but these gains are likely to be largely captured by the rail equipment industry regardless of rail sector liberalisation. The equipment industry, according to the Union of European Railway Industries (UNIFE), shows the following key figures:

- Turnover € 25 billion per annum.
- 130.000 direct employees and 250.000 total.
- 60% World market share and net exporter.
- Investment of € 1000 million per annum of its own resources in R&D.

Increased interoperability will have the effect of enlarging the potential market of this industry, due to open European procurement and the mutual recognition of each other's standards and specifications. Again according to UNIFE, a major change is occurred since the introduction of public procurement legislation, with inter-penetration of the market getting common practice, and all the suppliers will be increasingly engaged in competing for the production and sale of interoperable rolling stock. As a consequence, prices have significantly dropped.

Therefore, market impacts shall be assessed using a cost benefit analysis of TSI implementation, and considering the effects separately for all the relevant stakeholders:

- Rolling stock industry

- Railways undertakings
- Rail infrastructure managers
- Users of rail transport (passengers and shippers for freight)
- Local residents (which may be affected by external impacts, i.e. pollution, noise etc.)

This has been recently done with the Study “Benefits of Interoperability of ECORYS, VTT, SCI for the European Commission, which has produced amongst other things a cost benefit analysis of five priority TSI:

1. Telematic applications for freight services (TFS)
2. Control/Command and signalling (CCS)
3. Traffic operation and management, including staff qualification for cross-border services (TOM)
4. Noise problems deriving from rolling stock and infrastructure (Noise)
5. Freight wagons (FW)

The general scope of this study was limited to the area of Trans-European Networks excluding the high-speed rail network, i.e. the conventional rail network in the European Union (EU15) plus Norway. The benefits have been calculated for a period of 40 years: from 2005 to 2044. The benefits are formed by the difference between a future situation without the TSIs and a situation with the TSIs. Starting from a base case scenario, the study investigated what change each of the TSIs would bring about for the rolling stock industry, the rail undertakings and infra managers in terms of efficiency gains, reduction time and costs, and reliability changes. The investigation of the impacts was done on the basis of the literature study, interviews with experts and questionnaires.

One of the main findings of the study is that most of the TSI experts expect there will be a transition period in which rolling stock companies and railways undertakings will try to recover part of their initial investment in development and training and the cost of maintaining a dual system. During this period there will be benefits in the form of travel time savings, noise reduction and increase in safety. There will be also benefits in terms of efficiency gains. But during this period the efficiency gains will be smaller than impact of the recovery of investment costs. This will cause an increase in operating costs and as such will have a negative impact on rail usage. For TSI Telematic Applications the transition period lasts three years (from 2005 till 2007), for the four other priority TSIs this period lasts five years (from 2005 till 2009).

From the above discussion we may signal as key market indicators to be monitored in relation to the implementation of TSIs (ideally in the framework of a full CBA) the following:

- Travel time savings for passenger and freight transport users
- Efficiency gains for the rolling stock industry, railway undertakings and infrastructure managers
- Operating costs of the rolling stock industry, railway undertakings and infrastructure managers
- Rail usage, measured in terms of volume of passenger.km and tonne.km using the conventional rail network.

Outcome indicators: final impacts on transport users and non users

A direct impact of the measure will be to reduce travel times, producing potential time savings for rail transport users (both passengers and freight shippers). The main objective of the measure is also to contribute to the development of the trans-European networks and by this way to promote the modal shift from road to rail for goods transport and from air and car to rail in case of passenger transport. Therefore indirect impacts of the measure are:

- Changes in emissions of air pollutants: The modal shift from road / air to rail may induce a reduction in air pollutants emissions. This is true in particular for the shift from air to rail transport (which is however small if compared to road), because aviation is by far the most polluting freight transport mode, except for specific PM emissions. However, it must be remembered that shifting freight transport from road to rail without improving the environmental performance of diesel trains might have an adverse effect on transport emissions.
- Changes in safety: the modal shift from road / air to rail will increase safety as well.
- Reduction of noise: Technical Specification for Interoperability will cover also modern standard brake blocks of freight wagons which when installed on new freight wagons or retrofitted on existing wagons will reduce noise created by the wheel-rail interaction.