

**SAFETY REGULATIONS AND
STANDARDS FOR
EUROPEAN RAILWAYS**

Executive Summary

A Report for DG Energy and Transport

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February 2000
London

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EXECUTIVE SUMMARY

Transport has for many years been one of Europe's fastest growing industries. However this growth has not generally been shared by railways, despite their being environmentally friendly and the safest mode of transport. The European Union has addressed the many reasons for the relatively low growth of rail traffic, and developed a strategy to reverse this.

The Treaty on European Union included the broad aim of creating trans-European networks and promoting interoperability, in particular through technical harmonisation. For railways this is being pursued through three more specific objectives. These are improvement of interoperability; creation of a single market for railway equipment; and restructuring to develop competition and new markets in train operation.

As a consequence of these EU policies and associated national policies the European railway industry is now moving into a new era, very different from the previous world of each Member State's railway being dominated by a single, unified nationalised railway industry.

Safety regulation has been only in the background of these developments. However safety regulation regimes can have important implications on interoperability, the market in railway equipment, and competitiveness of the industry. These effects are both static: decisions about safety-related harmonisation or prioritisation can have important impacts on expenditure programmes of billions of euro; and dynamic: removing obstacles to innovation or new entrants can encourage evolution and growth.

This study investigates the extent to which European railway safety regulation has adapted, and might usefully further adapt, to the more varied and challenging needs of a world of competition in train operation, a single market in equipment, and new train services, both within and across borders.

Current safety regulation regimes

The first stage of the study examined the railway safety regulation regimes (RSRRs) of all 15 Member States. This was carried out by eight project partners in their own or in adjacent countries. It included a general analysis of the changing railway structure in each Member State.

In some Member States, with the break up of the vertically integrated nationalised industry, there has been a transfer of system-wide safety supervision to the infrastructure manager (IM), while in others the safety supervisory role is carried out by an independent national body, sometimes described as a Railway Inspectorate. The restructuring has led to considerable diversity in the structure and regulation of functions. This partly reflects the differing speeds at which restructuring has progressed in different Member States, but also reflects substantial differences in choices about how responsibilities should be distributed among operators, regulators and other institutions.

Most existing rules and standards in all Member States are still those created under the previous nationalised industry regime, and it is generally recognised that, however strong

the commitment to reform, substantial change in railway rules and standards cannot be made quickly.

We were invited to examine differences in “safety philosophy”, which we chose to define as covering punitiveness, the acceptance of cost as a consideration in safety policy, the role of the IM, separation of functions, the use of due process, and decision rules.

Strong punitiveness (in the sense of criminal sanctions after accidents, other than for intent or recklessness) is most systematic towards organisations in the United Kingdom, although it has occurred in other Member States after very serious accidents. Some other Member States take stronger punitive measures than the UK against individual members of staff. However punitive measures are virtually unknown in some Member States such as the Scandinavian countries and the Netherlands. We are aware of no evidence, nor has it been suggested to us, that greater punitiveness improves the efficiency of effectiveness of an RSRR. We note that, to the extent that punitiveness encourages secretiveness, it could be a negative influence.

The acceptance of cost as a consideration in safety policy, together with the use of risk assessment, also varied widely across Member State, reflecting differences in culture and in law. So too did the use of due process. These are all issues which were to be developed in later stages of the project.

The separation of functions also varied widely. For example the external regulatory control of specification, compliance, investigation and prosecution was were all carried out by one independent national body in five Member States, but by two bodies, with differing combinations of functions, in other Member States. The most significant of these differences we see as the establishment in some Member States of independent accident investigation bodies, which we recommend.

Some investigation was made into how the institutions regulating safety of metros and tramways overlapped with those regulating the mainline. We also examined for some Member States the interface between these lines and mainline operations. We found that the interfaces are scarce, although there could be more in the future. The differences between safety regimes in these different types of rail transport, while significant, do not appear to be a major obstacle to interworking.

Restructuring of the railways has led to a new framework for liability. Minimum international liability requirements are harmonised in the Convention Concerning International Carriage by Rail (COTIF). However Member States have differing ways of handling claims and differing levels of liability insurance requirements. There are signs that development in the international insurance market, helped by single market Directives, will develop satisfactorily in response to new demands, as interoperability progresses. A small obstacle to new entrants is that national railways are often exempt from requirements to buy insurance.

Turning to activity at the supra-national level, a major influence in co-operation between national railways is the UIC, whose standards are not mandatory in EU law, but are a major

component of acceptance criteria throughout Europe. The UIC's RIV and RIC codes for international acceptance of goods wagons and passenger carriages are long established, widely used and maintain their authority. The UIC is also proactive across a wide range of harmonisation activity, including safety.

Harmonisation of EU railway standards has focused on compatibility between railways in primarily engineering terms. The harmonisation process involves a large and complex administrative structure, with many technical committees developing standards in CEN, CENELEC and ETSI; further technical work at a more general level developing Technical Specifications for Interoperability under the high speed interoperability Directive; and the further layer of administration in the development of Directives - in particular on railway interoperability and the single market.

However, although safety is often a factor, these EU activities have had very little effect on national RSRRs. Nor do EU initiatives figure prominently in safety debate in Member States. We find in Member States remarkably little curiosity about the likely content of future European requirements.

The establishment, for implementation of the high speed interoperability Directive, of the AEIF, bringing railway operators together with manufacturers at the European level, is a major development. The AEIF has been mandated to accompany its draft Technical Standards for Interoperability (TSIs) with an assessment of the estimated costs and benefits of the technical solutions examined, and we have seen a cost-benefit methodology proposed for this purpose.

The draft conventional interoperability Directive closely follows the structure and provisions of the high speed Directive.

The impact of safety regulation

The impacts of RSRRs were investigated in seven Member States - France, Germany, Italy, the Netherlands, Spain, Sweden and the UK mainland of Great Britain. The investigation was based on three case studies, supported by broader discussions with suppliers and railway operators.

New and/or cross-border train services

Eleven cross-border freight and passenger train services were studied, with information being sought mainly from the railway operators. It revealed, as would be expected, that most of the obstacles to cross-border traffic arise from infrastructure differences in for example power supplies or signalling systems. However safety regulation issues are important.

Where traction crosses an international border, the norm is "levelling-up". Each regime requires all of its conditions to be met, in addition to the conditions required by the neighbouring regime.

Four new train operators (TOs) were approached. Where a new entrant wishes to introduce a service, the typical response of the infrastructure manager (IM) is to require the applicant to accept all of the responsibility and cost of persuading the IM that the service meets conditions which the IM may define only loosely, and which may depend on information about the infrastructure which the IM cannot provide. No new operators suggested that there was any deliberate discrimination against them, but most believed, to varying degrees and in different ways, that the established regulatory regimes were a brake on the development of new markets and, sometimes, on technical innovation, to a degree not justified by safety concerns. This was mainly because of a lack of clear definition of the requirements.

We take forward from the study of new and cross-border services the following conclusions:

- The views of “insiders” differ from those of “outsiders”. This is partly because of legitimate demands put on outsiders, but partly also because the procedures are less well adapted than they could be to the interests of outsiders.
- There are many demands of RSRRs in adjacent Member States which are reasonable in isolation but, when taken together, impede interoperability, without apparent compensating safety benefit.

Acceptance of new traction

Thirteen examples of new traction acceptance applications were studied, with information being sought mainly from suppliers.

These responses exposed three areas of criticism: about clarity of requirements or process; about costs, in terms either of the process or the requirements; and about ethos. They also raised two neutral issues: historic differences, and a shift in onus from operators to suppliers obtaining acceptance.

An underlying theme was that the accepting body (which in all cases was a nationalised industry or an ex-nationalised industry IM) did not take a system-wide view. Specific complaints were: off-loading costs on to applicants; unwillingness to take responsibility; fragmentation of the decision process; refusal to be pro-active in dealing with problems; unwillingness to accept test results from another country; and requirements being drawn up in excessive engineering detail.

It is likely that in many cases the accepting authorities would reject the criticisms, or claim that the costs involved were either justified by the safety issues, or attributable to failure by the applicants to understand the processes. We are not able to adjudicate between the positions in every case. In one case, where we could, a consensus emerged that the broad thrust of the criticisms was justified; but that many of the delays and some of the costs were attributable to the applicants. On both sides, the lessons are being learnt.

A common observation was that the onus for obtaining acceptance was now placed on the supplier (as opposed to the train operator(TO)). This was noted as a change from the previous nationalised industry regime. It was not expressed critically: in particular, it was observed that the supplier generally knows much more about the product than the user-to-

be. Where the product is intended for more than one market, as in many of the cases studied, it is not practical for other than the manufacturer to be in charge of the negotiation of acceptance processes, because the TO or local owner would not be aware of the repercussions of a design change on other markets or RSRRs.

We take forward from the study of certification of new traction the following conclusions:

- There should be some (relatively) immediate benefits from clarifying the requirements placed on operators and suppliers. There can be no safety argument against this - rather the opposite.
- The IM must be required to maintain and provide reliable infrastructure information, and accept the costs of putting the infrastructure right.
- The decision process should fulfil certain basic requirements for rationality.
- The question of ethos runs deeper. Although the industry is everywhere so integrated technically and operationally, and the staff have generally “grown up together”, the division into IM and TOs has led to a loss of system-orientation.

An examination of how risks and costs are balanced: The case of trackworkers

The study examined an application where some trade-off between risk and cost is de facto accepted in all Member States. (Every year trackworkers are killed, but train services are allowed to continue, even though the hazard which they pose could be eliminated by ceasing normal train operations when people are at work on the track.)

The Case Study sought information about the extent to which the different RSRRs *recognise* that there are options, which involve different levels of safety; and, given such options, *how the RSRRs handle the problems they present*, including making the choices between them.

The pattern of responses was clear-cut. Three RSRRs recognised the existence of options explicitly: Netherlands, Spain and Great Britain. Three recognised the existence of options indirectly and reluctantly: France, Germany and Italy. (The Swedish authorities felt unable to provide a full response.)

There were several strategies for taking the decision on what the rules should be:

- Decision by specialists: France (and probably others).
- Formulae which legitimise other than the maximum safety solution without explicit acknowledgement of economic factors: France, Italy, Spain.
- A criterion which explicitly accepts the legitimacy of economic considerations: GB, Netherlands.

We take forward from the study of rules for work on the track the following conclusions:

- There are difficulties in acknowledging explicitly the choices which are made between safety and other factors such as the costs of cancelling train services.
- Several Member States have however made this step, which seems essential to the development efficient regulation based on rational debate and choice.

Overview of current regimes and their impact

Industrial and transport safety hazards are widely regulated for good reason. The development of railways into a more dynamic industry, with more innovation, more operators including new entrants, and a wider range of suppliers, makes safety regulation even more important, to ensure safety. However regulation also imposes costs which, if it is not based on rational, consistent principles, can for some measures greatly exceed the benefits.

It is widely held within the railway industry that national RSRRs are not a material obstacle to innovation. Nor is the impact of differences between national regimes on the cost of supply widely seen by established operators or regulators as a major issue. A different view is generally held by those outside the established regime, such as train operators from another country or another industry, or suppliers wishing to develop wider European markets.

Whichever of these views is taken, experience in Member States points to the need for clearer requirements on infrastructure managers to provide information; meet costs arising from infrastructure not meeting standards; adopt a problem-solving, system-oriented ethos towards innovation; use criteria which balance costs and benefits; and consider existing equipment as well as new equipment when making decisions.

In addition to any avoidable costs in national RSRRs, the differences between national rail systems, including their RSRRs, also impose many costs. As with national regimes, some of these costs are static, such as the loss of economies of scale in production, and redundancy of approval procedures. Others are dynamic, such as obstacles to industrial restructuring, and to the entry of new suppliers or operators.

Continuing diversity is inevitable for many years because of inherited differences in infrastructure design; and some differences are efficient, as adaptations to local circumstances. However there is scope for reducing these diversities to achieve considerable cost savings, with no reduction and possibly an increase in safety. Many differences in standards appear to be accidents of history, reflecting differences of technical judgement, which could be removed at little if any cost in safety or commercial terms, if agreement could be achieved between the national authorities. Others are less clear cut, where the best degree of harmonisation could only be derived by detailed analysis.

One other important obstacle to cross-border operations, with some safety implications, is language.

There are many potential policy responses to diversity, most of which are already applied to European railways to some degree. These include in particular common standards (or “strict harmonisation”), mutual recognition, policed decentralisation, and self-regulation by the industry. All of these, and others, have a useful role.

Discussion

There are differing views about the distinction between safety and non-safety issues. If, for example, a document refers to “safety equipment”, then a precise definition is needed for the term in that context. Railway enterprises also need a specific safety function within their management structures. However in general we see serious drawbacks to confining safety to a special category, separate from the other functions of a railway, such as engineering design, operations, or training. We take the view that safety is one factor to consider in most issues of railway management and regulation, and that generally definitions of some issues as ‘safety’ and others as ‘operational’ should be discouraged.

The main driver of institutional change in the railways is restructuring of the railway operators, reinforced by globalisation of the supply market. These are further reinforced, for safety, by factors such as an increasing public concern with safety, the development of accident investigation as a trans-modal function, and a long term trend towards a more analytical approach.

The degree of restructuring varies greatly across Member States. In several Member States the IM functions remain within an integrated nationalised industry. In others contestable markets are developing for train operation, but there are many variants of the IM role. In some cases the IM is drawn closer to government than it was when with a nationalised industry; in others it is moved further away from government. In some cases the original IM functions of traffic management, safety regulation and infrastructure management may be separated. There may be an increase in the number of smaller IMs, independent of the dominant mainline IM. Perhaps predictably, we found no enthusiasm for any prospect of infrastructure management transcending national boundaries.

During the course of the study we received several comments about commercial incentives and railway safety. We discuss these and conclude that commercial incentives are as likely to be good as to be bad for the level of safety, given a sound regulation regime; and that some forms of subsidy can be bad for the efficient provision of safety.

We have considered the feasibility of estimating figures *ex ante* for the total cost of safety regulation, or the total benefits of harmonisation of safety regulation regimes. There would be presentational value in such numbers. However there are no alternatives to the *status quo* which are well enough defined and quantified, bearing in mind that any comparison would need to cover both the comparative costs and the comparative benefits of the present and hypothetical alternative regimes. Such numbers would also have to distinguish arbitrarily between ‘safety’ and ‘operational’ requirements on many fronts. All that can be said is that the gains from more efficient safety regulation, apart from some net gain in safety, can run to tens of millions of euro per year; and that it is most important that, although the calculation of *ex ante* aggregate figures of this kind is not feasible, *individual* proposals can and should be rigorously analysed.

As principles of good regulation we propose effectiveness, efficiency, fairness and transparency and accountability. Fairness and transparency and accountability are important even in an integrated, professionally managed system. However they are crucial for an efficient, open system with independent and changing participants.

To achieve all these principles there is a need for due process, which we define as meaning that a procedure must follow formal, well defined and generally open processes, as set out in key recommendation R1 below.

There is also a need, to the extent that it is possible, for quantification and valuation of costs and benefits, and for explicit rules about the policy criteria for choosing between alternatives. Formal analysis brings with it the potential difficulties of admitting in a political context that, at the design stage, trade-offs are made between safety and other benefits. We believe however that there is scope for a considerable further development of such analysis, and we include some discussion of issues such as individual risk, tolerability limits and societal concerns.

We briefly examined the handling of safety in other transport modes. Road safety provides an example of where the valuation of safety benefits is well established in most Member States. Aviation, which in most respects is much closer to railways, provides an example of international openness of accident investigation from which railways would benefit. This openness is attributable largely to the use of independent accident investigation bodies which, for European railways, are so far established only in Finland, Sweden and the Netherlands, and in a limited way in Denmark. Aviation also provides a good example of clear acceptance processes. However standard setting in aviation, while generally open with the industry fully involved, is not based on substantive decision rules which are clear and consistent. We conclude that there are reasons why due process, including clear and consistent decision rules for standard setting, are more important for railways.

As we considered the national safety regulation regimes there emerged a picture, which we believe is broadly uncontentious, of what would constitute good practice. In this picture a regulator takes into account safety and operational considerations, seeking the best balance on the basis of expert analysis and the interests of all those concerned - the industry, its customers and wider society. The decision process is open, subject to privacy concerns and the safety interests of confidentiality, and follows due process for all parties. It makes appropriate use of expertise, and explicit quantitative comparisons of costs and benefits are employed where necessary. It recognises explicitly that there are choices to be made, and that sometimes it is right to incur avoidable risks because the cost of avoiding them cannot be justified. The basis on which such judgements are made is public. The regulator's job is to ensure that operators strike the right balance between safety and other factors, although there are times when the regulator presses for safety, to the extent that operators have incentives to under-provide safety rather than over-provide.

We have gone on to construct two stylised sets of characteristics for safety regulation regimes. In one set (type A), safety issues are essentially separated from operational issues, and the explicit comparison of costs with safety benefits is denied. The other set (type B) follows the good practice ideal. In any regime the balance between these characteristics may (and perhaps needs to) vary between regulatory functions. However we suggest that, in most applications, movement further away from the first of these sets of characteristics towards the second would be good for railway safety regulation in Europe today.

Interoperability is now becoming a major driver for development of the European railway. In relation to the implementation of the high speed interoperability Directive, we found evidence of a lack of awareness of potentially far-reaching developments within the AEIF process, stemming in part from the inaccessibility of some key documents emerging from that process. In respect of conventional interoperability, union policies are still being formulated.

We draw a wide range of conclusions set out in section 6.1. Our key recommendations which are reproduced in full below are seen as high priority and in principle realistic. These relate to administrative effectiveness, and to some increase in emphasis on the final objective of competitiveness, as distinct from the intermediate objective of harmonisation.

For most of the recommendations implementation would depend upon expert and powerful bodies, within which differing views no doubt prevail, being persuaded that they are for the common good and worth supporting. They are in all cases designed to help steer the very high professional skills, energy and commitment within the industry, which have been evident throughout this study, most effectively into the changing transport environment of the 21st century.

Key recommendations

Due process, decision rules and the definition of safety

- R1 We recommend that the EU policy should be designed to steer European rail safety regulation progressively towards due process, within which procedures:
- are documented;
 - make relevant information available to all parties; and provide for all affected parties to be heard;
 - are applied consistently, with specified substantive (as well as procedural) decision rules;
 - give reasons for decisions;
 - are subject to independent appeal; and
 - are preferably subject to staged timetables (whether triggered by passage of calendar time, or triggered by particular events).
- R2 We recommend that information on safety performance (relating to both accident investigations and overall statistics) should be publicly available.
- R3 We recommend that EU policy should be designed to steer European railway safety regulation towards stronger analysis of costs and benefits and explicit substantive decision rules.
- R4 We recommend that decisions made under EC Directives involving railway safety (which may include most standard setting), at all stages from first proposal to submission for final approval (for example to the Article 21 Committee), should be required to be supported by a statement:
- outlining the proposal and alternative ways of achieving the given objective;

- setting out relevant costs and benefits, quantified where possible;
- making explicit any political or other judgements superimposed on quantitative analysis of costs and benefits.
- justifying the proposed course of a action by reference to those costs and benefits which can be valued, and an explicit account of other significant factors;

This approach should be adopted for informal as well as formal decisions.

- R5 We recommend that, when European legislation is used to harmonise on technical, engineering and operational matters, safety issues should be dealt with explicitly, but as an integral part of those rule-making processes. Safety regulation and safety management will always be specific and important tasks, but the separate classification of issues as either 'safety' or 'operational' should generally be avoided.

EU promotion of actions at Member State level

- R6 We recommend that the EU should seek to encourage, through legislation, the railway safety regulation regimes of Member States to provide the due process, separation of powers and availability of information needed for the satisfactory development of interoperability, the single market, new operators and other innovation.
- R7 We recommend that the Commission should encourage the development of independent accident investigation in Member States and consider a Directive to this effect.

EU promotion of actions at the European level

- R8 We recommend that bodies at the European level should be created or strengthened to carry forward a number of key central tasks, including the following. (While some of these tasks extend beyond safety, they are necessary for the effective development of safety regulation.)
- Appointment of an engineering project management team to manage the coordination of the output of the many technical committees which are contributing to the development of European railway standards and to promote due process.
 - Development of methodology for risk assessment, including procedures for the identification of options, and for quantifying and valuing the costs and benefits of safety regulation proposals.
 - Widening of public access to the TSI process - for example by release to a website of relevant documents and current drafts.
 - Clearance of new national standards, with the explicit requirement that Member States do not to make rules or take decisions on rail safety issues that materially detract from interoperability or the development of the single market.
 - Negotiation of recognition by Member States of relevant conformity approvals in other Member States.

- Identification of “zero-cost” and other potential measures for harmonisation which may be cost-effective. Assessment of the costs and benefits of such measures and realistic timescales.
- Development of safety performance and other safety-related data.
- Promotion of European level debate on the problems of language.

R9 We recommend that these tasks should be carried forward by:

- 1) A much strengthened railway industry body, extended from and including the joint representative body function of the interoperability Directives, now carried by the AEIF; and
- 2) A new Railway Agency, as an EU institution, providing an executive interface between DG Energy and Transport and the industry.

R10 We recommend that the Commission should consider the option of establishing an EU-wide rail accident investigation agency, or regional agencies.

EU promotion of research

R11 We recommend that the Commission should fund research on the following, to lay the foundations for stronger central coordination:

- identification of differences in specific rail safety regulations or procedures which it may be cost effective to remove or reduce, and assessment of the associated costs and benefits and time scales.
- means of developing safety performance and other safety related data.
- use of different risk assessment methodologies (including the comparison of costs and safety benefits) across European regulated industries.

We recommend that the Commission should seek the assistance of the independent national regulators in these tasks.