HARMONISING SAFETY MANAGEMENT SYSTEMS IN THE EUROPEAN RAILWAY SECTOR

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Abstract - The European Commission has set railway policy to encourage the liberalisation of the railway industry across all European Union member states. A single market for railway services is envisaged as a means to improve the competitiveness of the railways with other modes of transportation. A key piece of the legislation implemented in response to this policy, is the Railway Safety Directive. This legislation recognises that it is not just technical and procedural harmonisation that is required to create an effective internal market for railway services in Europe. Safety Management practices must also be harmonised. One of the elements of the directive is the requirements that all Railway Undertakings (who run train services) and Infrastructure Managers (who maintain the railway network) in European members states implement a Safety Management System which meets certain criteria and is certified by the relevant National Safety Authority. The European research projects SAMRAIL (Safety Management in Railways) and SAMNET (Safety Management and Interoperability Thematic Network for Railways) were funded by the Commission to investigate and to propose practical approaches to help implementation of the requirements in the Railway Safety Directives. As part of this research detailed guidance on how to structure and implement a Safety Management System that was suitable for and compatible with Europe's future railway environment was produced. In this paper we describe those aspects of the Railway Safety Directive relating to Safety Management Systems, including the proposed certification requirements, and outline the proposals made by SAMRAIL and SAMNET for effectively implementing safety management systems.

1.   DEVELOPMENT OF AN OPEN AND SAFE EUROPEAN RAIL SYSTEM

The White Paper (2001) proposed to revitalise the railways in the European Union (EU). The European Interstate Rail Network is made up of infrastructure in all the member states and is interconnected within Europe and to Border States. This network exhibits a low interoperability level: infrastructure, rolling stock, operating procedures and safety are not currently standardised. This situation is due to the fact that Europe comprises different member states where railways have been developed in different historical, geographical, and cultural environments. The safety culture in different member countries is also particularly variable.

1.1   Creation of an 'open' railway network

The European Community regards its railways as an economic, efficient, environmentally friendly and very safe mode of transport. However, in the recent past, a substantial share of the railway market has been lost to other modes of transport. To compete on equal terms, the Community believes that its railways need a liberalised rail transport market similar to those in the civil aviation and maritime sectors. This approach requires some major changes in current practices, such as introduction of more self-regulation for companies operating in the rail sector, and increased openness and transparency in all member state railways. More integration of railway networks to facilitate cross-border operations is also needed. However, numerous and incompatible safety standards and practices present major obstacles to these aspirations.

In order to facilitate this common railway market, the Council Directive [Directive 91/440/EEC (1991)] advocates a progressive opening up of rights of access to the infrastructure to any licensed railway undertakings.

The technical and operational fragmentation between the railway systems of the Member States is a major hurdle for the development of a single European railway, so the Council Interoperability Directives [Directive 96/48/EC (1996) and directive 001/16/EC (2001)] have defined essential requirements and established a mechanism for explaining mandatory technical specifications for interoperability. Furthermore, the European Railway Safety Directive [Directive-2004/49/EC (2004)] emphasises the development of Safety Management System, Common Safety Indicators [Barbu.G (2004], Common Safety Targets [Rafrafi.M (2007)] and Common Safety Methods through independent technical expertise and promotes the development of harmonised format for safety certificates/authorisations and their applications.

1.2   Policy initiatives and regulatory framework

Safety policy for the railway industry cannot be created as the sum of national safety policies and regulations. A common safety policy is essential to the future of the industry in Europe. Harmonisation of the regulatory framework is seen as a key part of creating this commonality. The proposed frameworks contains:

A clear establishment of the responsibilities for:

- The railway companies that have to express a set of internal rules proving their compliance to national and federal laws, regulations and rules. One of the major points is the formalisation of the responsibilities of the railway companies in their part of the system in a document "Safety Management System" that expressed how the company reaches all the safety requirements.

- The railway authority especially in safety that have the responsibilities of enforcing the laws, regulations and rules, following the safety certification of railway companies and supervising that all induced requirements are met by railway companies.

- An accident/incident investigation body that has the responsibility of conducting an independent inquiry on incident and accident that occur in rail.

A process for safety certification of railway companies that involves the railway companies and the railway authorities in safety.

A process for incident and accident investigation that involves railway companies, railway authority and all relevant parties that may have an interest in the conclusions of the inquiry.

In recent years, the European Commission has begun to develop several railway initiatives, which are aimed at encouraging open market policy and harmonising the railways in Europe via technical and operational interoperability. This safety directive is designed to facilitate:

- **Horizontal integration**, i.e. interoperability of the networks facilitating smooth movement of passenger and freight trains,

- **Vertical separation,** e.g. between management of infrastructure and train operation and outsourcing of maintenance and support functions,

- **A due and transparent certification process** to improve safety approval and equipment acceptance.

The safety policy generally reflects the safety philosophy and safety culture of a country. The main influencing and powering factor is the transport market, which is part of the total market of a country, both national and international. In this context, the European Commission began to develop several railway initiatives in order to harmonise the railways in Europe with interoperability and market opening as goals. These goals cannot be achieved without setting out high common safety standards. The European Safety Directive aims at harmonising the regulatory structure that enforces railway operation and to ensure the development and improvement of safety on the Community's railways by:

- Maintaining the global railway safety in each Member State.

- Harmonising the regulatory structure in the Member States.

- Defining responsibilities between the actors.

- Developing common safety methods, common safety indicators and common safety targets [EL Koursi.E.M (2007)].

- Requiring the establishment, in every Member State, of national safety authorities and national bodies for accident investigation.

- Defining common principles for the management, regulation and supervision of railway safety.

2.   SAMNET AND SAMRAIL PROJECTS

SAMNET and SAMRAIL [http://samnet.inrets.fr/] are two research projects launched by the European Commission in 2003 to investigate and to propose the approaches to specify and to implement the requirements identified in the Safety Directives. These two projects are closely managed and the SAMRAIL partners were involved in the thematic network untitled SAMNET

SAMRAIL stands for SAfety Management in RAILways. This accompanying measures project ends its activities on July 2004. It was in charge of developing a proposals to implement the safety directive requirements.

SAMNET stands for SAfety Management and interoperability thematic NETwork for railways system". This thematic network ends its activities on December 2005. It was in charge of refining the proposals made by SAMRAIL by using a large consultation of stakeholders and developing a position papers related to safety directive requirements.

In particular, issues concerning policies on Safety Management System, Common Safety Indicators, Common Safety Targets and Common Safety Methods were addressed by these projects [El Koursi.E.M (2006)]. The aim was to communicate the knowledge, experience and best practice collected during the Projects to various types of audience including Regulatory Authorities, Transport Authorities, Transport Operators, Managers of Infrastructure, Standardisation Bodies, Notified Bodies, Universities and Research Centres, Passengers Organisations, Manufacturers and Engineering Companies.

The main task of the SAMNET Project was to develop a consensus on the management of safety in the railway sector by involving a substantial number of industry stakeholders in the work. These stakeholders were able to provide input to, and comment on, the harmonized concepts and practices proposed. The project undertook:

Development of guidance notes on Safety Directive issues and SAMNET/SAMRAIL findings for creating awareness among the policy makers, management and staff

Workshops on individual topics, seeking opinions from the experts and raising awareness

Case studies to check if the suggested approaches (Safety Management System (SMS), Common Safety Indicators (CSI), Common Safety Targets (CST), Common Safety Methods (CSM) and certification processes) are workable

Liaison with different trade and technical associations and organisations, such as AEIF (Association Européenne pour l'Interoperabilité Ferroviaire), EIM (European rail Infrastructure Managers), CER (Community of European Railways), ERRAC (European Railway Research Council), and identify their stances on the issues raised by SAMNET and SAMRAIL.

As part of SAMNET and SAMRAIL activities, detailed guidance on how to structure and to implement a Safety Management System that was suitable for and compatible with Europe's future railway environment was produced.

In this paper we describe those aspects of the Railway Safety Directive relating to Safety Management Systems, including the proposed certification requirements, and outline the proposals made by SAMRAIL and SAMNET for effectively implementing safety management systems.

3.   SAFETY MANAGEMENT SYSTEM DEVELOPMENT IN RAILWAY SECTOR

3.1   Review of existing SMS

Major legislative changes have been undertaken across European in the last few years. In addition to this there are ongoing technological changes that are occurring. Therefore there is the potential for instability and confusion in the railway industry resulting in an overall increase in accident risk. These changes affect not only the organizational and technical innovations developed with the new systems, but also the new stakeholders and

financial arrangements derived from the major changes. Safety management is an important issue in all safety critical sectors, and regarded as an important means for improving safety culture. Whereas in the process control and nuclear sectors follow voluntary codes, the civil aviation and maritime sectors have formalised this through their respective international organisations [Figuera.R (2003)]. To promote the development of a single European rail transport system which offers the same, and if possible a better, level of railway safety, infrastructure managers and railway undertakings must adopt a safety management system based on common principles. The aim is to maintain an integrated safety management system in a context of multiple railway undertakings. The key items to be harmonised to produce such a safety management SMS system are based on the definition of a typical safety management system (a set of methods and actions to identify and manage activity-related risks)[Hale.A.R (1997)].

3.2 SMS approach

A safety management system (SMS) [Bearfield.G (2004)] is an organisation's formal arrangement, through the provision of policies, resources and processes, to ensure the safety of its work activity. An effective SMS helps the organisation to identify and manage risks effectively. It allows an organisation to demonstrate its capability in achieving its safety objectives and in meeting regulatory requirements. A crucial aspect of RU's and IM's safety management activity will be the management of interfaces. In many member state railways the new organisational structure will increase the number of interfaces, and hence introduce potentially new types of risk. An organisation faces essentially three different types of risk to its operations:

- *Internal risks,* i.e. those associated with activities and locations for which the organisation is solely responsible.

- *External risks,* i.e. those originating from systems, people or organisations and processes that are outside the organisation's control.

- *Shared risks,* i.e. risks associated with activities or locations for which there are shared responsibilities rather than sole ownership; to manage such risks the organisations have to ensure that compatible approaches are used.

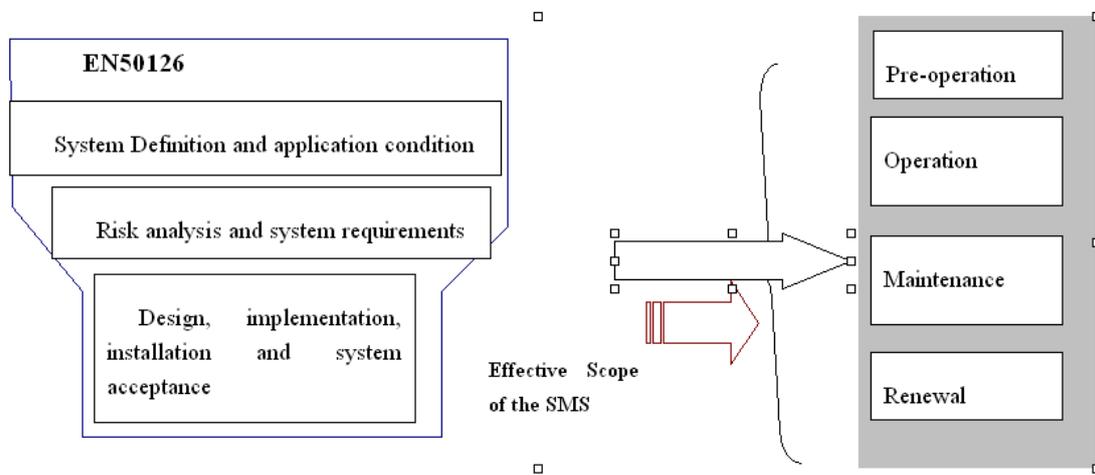## 3.3 Lifecycle Stages of the Railway Transport System

Figure 1: Appropriate SMS guidance for each lifecycle phase.

The main lifecycle stages of a Railway Transport System have been discussed in European norms and other similar documents, a schematic view of this is presented in Figure 1. Mainly, the SMS framework focuses on generic management issues. Its actual effectiveness very much depends on how this framework is applied to the specific business processes related to the systems, subsystems and equipment the duty holder controls. There should be specific elements of any developed SMS that deal with aspects of each of the following stages of the Railway Transport System lifecycle:

- **Pre-operation:** Safety approval, system handover and acceptance are therefore crucial interfaces between the developer and the duty-holder that need to be managed effectively to ensure safety. The duty-holders need to assure themselves that the system development has been undertaken in a manner that is consistent with the risk tolerability criteria set for this overall Railway Transport

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System SMS framework. This assurance will be supported by evidence of application of a robust development process such as that described in safety CENELEC standards or equivalent [CENELEC EN 50126 (1999), CENELEC EN 50128 (1997) and CENELEC EN 50129 (2003)]. This approach implies that the developer should be aware of the risk tolerability criteria. The duty-holder must also assure itself that the overall system, within which any procured element is to be used, remains safe. Ultimately the RU and IM are responsible for the safety of the integrated railway environment. Each duty holder should have in place necessary arrangements for accepting new components. This should ensure that only 'operationally ready' equipments, subsystems or systems are accepted for operational usage. The acceptance criteria used for such purposes should comply with EU and national requirement, and their integration and commissioning procedures with the Railway Transportation System should be identified.

- **Operation**. The duty holder should have the necessary arrangements for identifying the operating requirements of the equipment, subsystems and systems it controls. They should include requirements and constraints for their normal and degraded modes of operation. Generally, regulations, rulebooks and work procedures provide detailed instructions for performing critical operations. The duty holder organisation should specify how these rulebooks are to be developed, how the rules will be formulated, written and approved; how the use of rules will be monitored and, where appropriate, how the rules will be enforced or modified and maintained to improve their performances.

- **Maintenance.** A duty holder should have adequate arrangements for implementing planned and preventative maintenance (including, where appropriate, maintenance based on monitoring of equipment condition) of its equipment, subsystems and systems. All such items should be identified, prioritised in terms of frequency and standard of maintenance and adequate resources identified to meet the maintenance schedules. The procedures for removing items from the operation and for preparing them for maintenance should be identified. Similarly, procedures for commissioning and accepting repaired items for operational use should be identified.

- **Renewal.** A duty-holder should have necessary arrangements for identifying and planning renewal work which it has to undertake for regulatory or business reasons. For example, for maintaining performance level a duty holder may need to carry out like for like replacement for time-expired assets, or introduce new technology to improve performance. There should be procedures for monitoring critical items and preparing plans for their timely replacement.

The duty holder should also have adequate processes for identifying and planning new work arising from the business needs or regulatory requirements, for example which require introduction of new technology, new operations, or new procedures. The whole SMS framework should be applied to each of the listed lifecycle phases. It may be that specific adaptation or expansion of a duty holder's overall generic SMS may be required to address specific issues relating to the various lifecycle phases. The duty holder's risk management arrangements are key to the adequate and full development of the duty-holders SMS. The risks associated with each of the lifecycle phases will be different and hence different standards will need to be used, and different risk control measures will need to be developed. Arrangements for how risk is managed will therefore be different. Also it is likely that different personnel will be involved at each stage therefore a different organisational structure, role profiles and competence assurance process may be required.

A key source of risk is at the transition between lifecycle phases, e.g. the resumption of operation after a period of maintenance. Lifecycle transition should be explicitly addressed in risk assessment activity. It is assumed that all the concerned work places, e.g. operational area, maintenance depot and project site should be subjected to required Health and Safety at Work regulations.

The activities undertaken by an organisation will generally be based on accepted knowledge (as represented by standards, national safety rules etc) or measures derived by the organisation based on their analysis and understanding of the hazards that their business is exposed to. Risk assessment practices are the formalised way in which the organisation ensures that such derivation is rigorous. Therefore at any given time the planning and risk control system in place is dependent on the organisation's understanding of the risks it is exposed to, and how best to minimise them. The learning system [Koornneef.F (2004)] comprises of the activities in place to continually assess the effectiveness of these arrangements [Bearfield.G (2004)]]. In an effective SMS there will therefore be a constant evolution of the planning and risk control practices as the understanding of the organisations effectiveness at managing risk changes.

3.4 Safety Management System proposed structure

The analysis of the literature [Hale.A.R (2000) and Darby.T (2005)], the existing safety management practices of the member state railways and the experiences of other safety critical sectors (such as the civil aviation, maritime, nuclear and chemical sectors) as the baseline information for the production of the SMS structure and framework [Figuera.R (2003)].

The Table 1 shows the proposed eleven elements of the SMS that are divided into two parts: Planning and risk control system (Table 1: Elements 1 to 9) and learning system (Table 1: Elements 10 and 11), in order to emphasise the dynamic nature of a good SMS. This organisation of SMS structure should be refined at Stakeholders level and should consider the operation, maintenance and renewal phases of the life cycle of the railway system.

SMS's elements	Requirements
(1) Nature and Scope of Duty Holder's Business	Duty holders should identify the nature and scope of their business operations. In particular they should clarify which elements of the Railway Transport System they are responsible for developing, operating, and maintaining. They should be aware of their safety management responsibilities as required by Article 4.2 of the safety directive and other national requirements. In particular they should clearly state their understanding or any joint, or shared responsibilities with other parties.
(2) Safety Policy	Senior Management should provide a clear statement of its commitment to ensuring safety. This commitment should be effectively communicated throughout the duty holder organisation and should be apparent in: → The visible actions of management → The processes and procedures that they put in place → The resources that they allocate → The duty-holder organisation's joint arrangements for managing safety with other duty holders and industry stakeholders.
(3) Organisational structure and Responsibilities	Each duty holder should establish and maintain clear and unambiguous lines of authority, accountability and responsibility for ensuring safety at all levels within the organisation. Responsibilities for interfacing with other organisations, such as safety authorities, IM and other RU, should be identified and properly integrated within the line management of the organisation.
(4) Competence, Training and Fitness	Each duty holder should ensure that its employees have appropriate experience, knowledge, skills, abilities and fitness to discharge their responsibilities. Their competence should be regularly evaluated and any identified deficiencies should be addressed through training, recruitment and/or organisational change. All necessary arrangements should be in place to help with the continuous improvement of their skills.
(5) Risk Management	The duty-holder should have in place procedures for identifying areas of risk throughout the organisation, assessing it and determining effective control measures to reduce or eliminate it. Risk assessment should be carried out using the Common Safety Methods (CSM), and residual risks should be consistent with Common Safety Targets (CST).

SMS's elements	Requirements
(6) Safety Assurance	Where risk within the duty-holder's overall area of responsibility, is not under their direct control, they must ensure that such risk is appropriately managed. The duty-holder should put in place procedures to ensure that such activity is undertaken in accordance with their overall SMS, and appropriate risk levels are achieved. Such consideration may require contractual commitments to be placed on those undertaking such activity (and hence should be considered at the earliest opportunity before commissioning contract work).
(7) Emergency Management	The duty-holders should put in place a framework and generic procedures for managing response in the event of emergencies and specific procedures for managing foreseeable emergencies. These procedures should address the minimisation of risk in the event of emergencies, stabilisation of the railway and its operation, sustaining of degraded operations, and recovery to normal operations.
(8) Safety Communication and Information Integrity	Safety communications and information should be defined and documented. All duty holders should ensure that they are aware of the criticality of the various communications within their organisation. The integrity of safety communications and information should be managed as appropriate to this level of criticality. All safety related documentation should be under strict change control.
(9) Management of Rules and Standards, including Compliance	Duty-holders should have procedures in place for the identification of legislation, rules, standards and technical requirements relevant to their work activity. They should also have in place procedures to ensure that these requirements are complied with. Procedures should also address the management of non-compliances which should be undertaken according to a risk-based process consistent with the organisations overall SMS and risk criteria.
(10) Incident and Accident Reporting and Learning	Duty-holders should put in place procedures for routinely, reporting and investigating accidents and incidents. Such processes should encourage reporting amongst staff. Duty-holders should also have procedures for learning from incidents and accidents. Incident and accident findings should be disseminated throughout the organisation, and with other relevant organisations.
(11) Monitoring, Auditing, Corrective Measures and Annual reports	The duty-holder should have in place procedures for the monitoring, and audit of the SMS. Such review should be undertaken regularly. The duty-holder's SMS should contain procedures to ensure that corrective measures identified via audit and monitoring are fed back and implemented. The duty holder should have procedures for preparing and releasing annual safety reports to the relevant Safety Authority/Authorities.

Table 1: Structure of Safety Management System

3.5   SMS Structure mapped to Annex III of the railway safety directive

The European railway organisations provide a very safe service and are good at managing the safety of their systems. Prior to the publication of the Railway Safety Directive many countries did not have an identifiably separate formal Safety Management System (SMS). However, their existing management approaches were adequate for the type of work they undertook at that time. The structure of the SMS proposed in Annex III of the Railway Safety Directive is based on the information available from various European railways [UIC (2004)]. Although formal safety management systems were not in place for all railway undertakings and infrastructure managers in the European Union, it was found that the fundamental SMS elements required for such organisations (as outlined in Annex III of the Safety Directive) were substantially in place for all countries. Such elements had, by necessity, developed in each country through ongoing efforts to safely manage their railway. However, these practices needed to be formalised. The framework and subsequent guidelines were developed to ease this process where such formal SMS do not exist. Review of existing safety management systems both in railways and in other

industries also indicates that the headings defined in Annex III of the safety directive may not be explicit enough to cover all aspects of good practice. Where it is believed that this is the case, proposals will be made for expansion or explication of the elements in Annex III [Table 2].

The basic elements of the safety management system required by the railway safety directive	Relevant elements from the proposed SMS framework
(a) A Safety Policy approved by the organisation's chief executive and communicated to all staff	1) Nature and Scope of Duty Holder's Business 2) Safety Policy
(b) Qualitative and quantitative corporate targets for the maintenance and enhancement of safety and plans for reaching the targets;	5) Risk Management
(c) Procedures to meet existing, new and altered technical and operational standards laid down in TSI or in national rules referred to in Article 7 and Annex II or in other relevant rules and procedures to assure compliance with the standards throughout the life-cycle of equipment and operations;	10) Management of rules and standards, including compliance
(d) Procedures and methods to carry out risk evaluation and implement risk control measures whenever a change of the operating conditions or new material imposes new risks on the infrastructure or on operations;	5) Risk Management 6) Safety assurance
(e) Provision of programmes for training of staff and systems to ensure that the staff's competence is maintained and tasks carried out accordingly;	3) Organisational structure and Responsibilities 4) Competence, Training and Fitness
(f) Arrangements for the provision of sufficient information within the organisation and, where appropriate, between organisations operating on the same infrastructure;	9) Safety communication and information integrity
(g) Procedures and formats for how safety information shall be documented and designation of procedure for configuration control of vital safety information;	9) Safety communication and information integrity
(h) Procedures to ensure that accidents, incidents, near misses and other dangerous occurrences are reported, investigated and analysed and that necessary preventive measures are taken;	7) Incident and accident reporting and learning
(i) Provision of plans for action and alert and information in case of emergency, agreed upon with the appropriate public authorities;	8) Emergency management
(j) Provisions for recurrent internal auditing of the SMS.	11) Monitoring, audit, corrective measures and annual report

Table 2: Cross-referencing Annex III of the Safety Directive to the SMS elements outlined in the guidelines for SMS document

3.6 SMS Structure mapped to PDCA cycle

The Proposed Guideline for the Safety Management System is based on Deming Cycle. However, because of our chosen basis, i.e. the existing SMS of the EU railways, we had to expand and elaborate different stages of PDCA (Plan, Do, Check and Act) a slightly different way than the quality or environment management system standards [Table 3]. To best of our knowledge the proposed guideline covers all the stages of PDCA cycle, and contains some specific elements known to be critical to railway safety management, e.g. I&A reporting, safety communication. In fact, the structure used in the guideline is compliant with the PDCA cycle and comparable to those OHSAS 18001, ISO9001 and ISO14001. The following table shows these relationships.

PDCA	Quality management		Environment Management		Suggested SMS	
Plan	Management responsibility	Commitment / Customer focus / Quality policy	**Plan**	Management commitment – define program intent	Nature and scope of duty holder's business / Safety Policy	
		Planning		Aspects – impacts – regulatory issues	Risk Management	Risk identification
		Responsibility, authority and communication		–internal performance Criteria		Risk control
		Management review		–Management Program		Safety assurance
Do	Resource management	Provision of resources	**Implement**	Responsibility/accountability – staff, physical & capabilities	Organisational structure and Responsibilities	
		Human resources / Infrastructure / Work environment			Competence, Training and Fitness	
Check	Product realization	Planning of product realization / Customer-related processes / Design and development	**Check**	Operational control / Communication/ reporting/documentation / Performance indices	Incident and Accident Reporting and Learning	
		Purchasing / Production and service provision			Emergency Management	
		Control of monitoring and measuring devices			Safety Communication and Information Integrity	
Act	Measurement analysis and improvement	Monitoring and measurement / Control of nonconforming product / Analysis of data / Improvement	**Review**	Problem reports – management review – problem resolution	Monitoring Auditing, Corrective Measures and Annual Reports	

Table 3: Suggested SMS structure mapped to PDCA cycle.

4.   SMS CERTIFICATION, AUTHORISATION AND REPORTING PROCESSES

The objective of this section is to describe the process for implementing the Safety Directive's certification and authorisation requirements. The roles of the various stakeholder organisations within these processes are also defined. It also describes the products/deliverables to be developed to facilitate the processes and the requirements for transparency of these processes and products. The key actors in the processes are defined in the Safety Directive. The actors include the following:

Infrastructure Manager (IM) : Any body or undertaking that is responsible for establishing and maintaining railway infrastructure which may also include the management of infrastructure control and safety systems. Current infrastructure managers in the EU are companies like Network Rail in the UK, Pro-rail in the Netherlands and departments within national railway organisations such as DB and SNCF.

Railway Undertaking (RU): Any public or private undertaking licensed according to applicable community legislation, the principle business of which is to provide services for the transport of goods and/or passengers by rail with a requirement that the undertaking must ensure traction; Businesses referred to as 'Train Operating Companies' in the UK and Netherlands are typical examples of railway undertakings.

Safety Authority (SA): the national body entrusted with the tasks regarding railway safety in accordance with this directive (e.g. The UK HSE, or EBA in Germany) or any bi-national body entrusted by member states with these tasks in order to ensure a unified safety regime for specialised cross border infrastructures (e.g. Channel Tunnel Safety Authority).

4.1 SMS Certification and Authorisation Processes

Safety certification of RU

In order to be granted access to a Member States railway infrastructure each RU is required to obtain safety certification from the relevant safety authority. Safety Certification is in two parts:

The first part of the certification (Part 1) is confirmation of the safety authority's acceptance of the railway undertakings SMS, in compliance with the Safety Directive.

The second part of the certification (Part 2) confirms acceptance of the railway undertakings arrangements to meet the application specific elements of their operations (e.g. TSIs, national safety rules and so on).
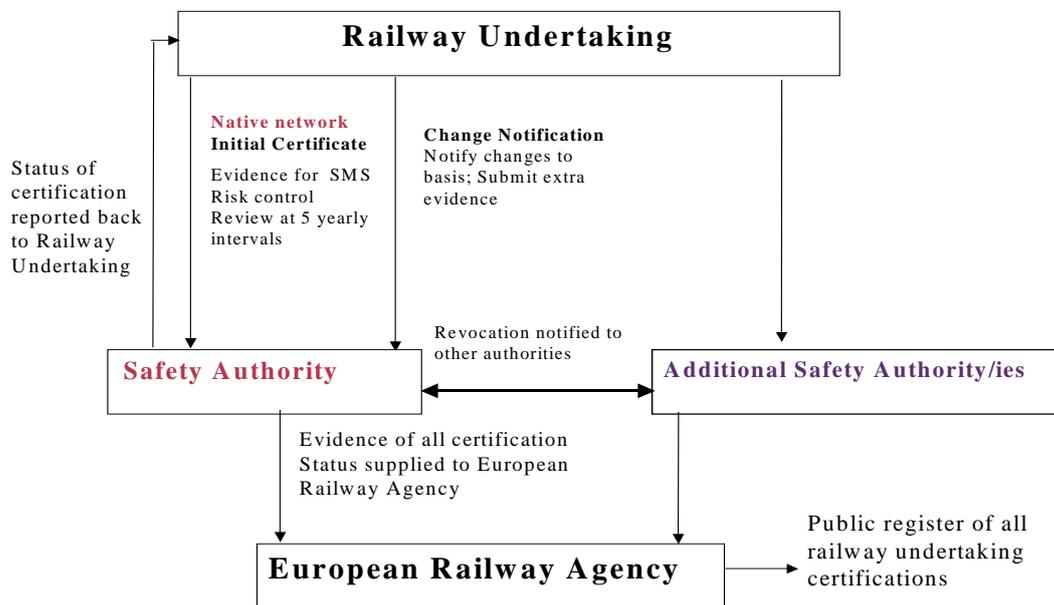

Figure 2: Safety certification process for Railway Undertakings

The Safety Authority in the Member State where the RU first establishes its operation shall grant both parts of the certification – 'Part 1' and 'Part 2' – as described above. The Safety Authority will provide detailed guidance on how to obtain the safety certificate [Figure 2]. This guidance will list all requirements; national safety regulations, rules and standards and so on. Any further relevant documentation required will also be made available to the applicant [El Koursi.E.M (2005)]. Where a RU is seeking operation on an additional Member State's railway, 'Part 2' level certification only will need to be sought from that Member State's Safety Authority. This 'Part 2' level certification will be required from each Member State whose infrastructure the RU seeks to operate on. The 'Part 1' aspect of certification should be transferable between Member states. A RU's safety certificate must be renewed, at the latest, every five years after the initial certification by the Safety Authority. This renewal process may involve several safety authorities, where a RU has multiple 'Part 2' safety certifications. Each national safety authority shall inform the European Railway Agency, within one month, of all safety certificates that it has issued, renewed, amended or revoked. The European Railway Agency will maintain a public register of all undertaking certifications.

Safety Authorisation of Infrastructure Managers

In order to be allowed to manage and operate a rail infrastructure, the IM is required to obtain safety authorisation from the relevant safety authority (in other words, the safety authority in the Member State where the infrastructure is). The safety authorisation will need to comprise:

Authorisation confirming the acceptance of the infrastructure managers safety management system in compliance with the Safety Directive, and the high level requirements detailed in this document.

Authorisation confirming the acceptance of the provisions of the IM to meet specific requirements necessary for the safe design, maintenance and operation of the traffic control and signalling system.
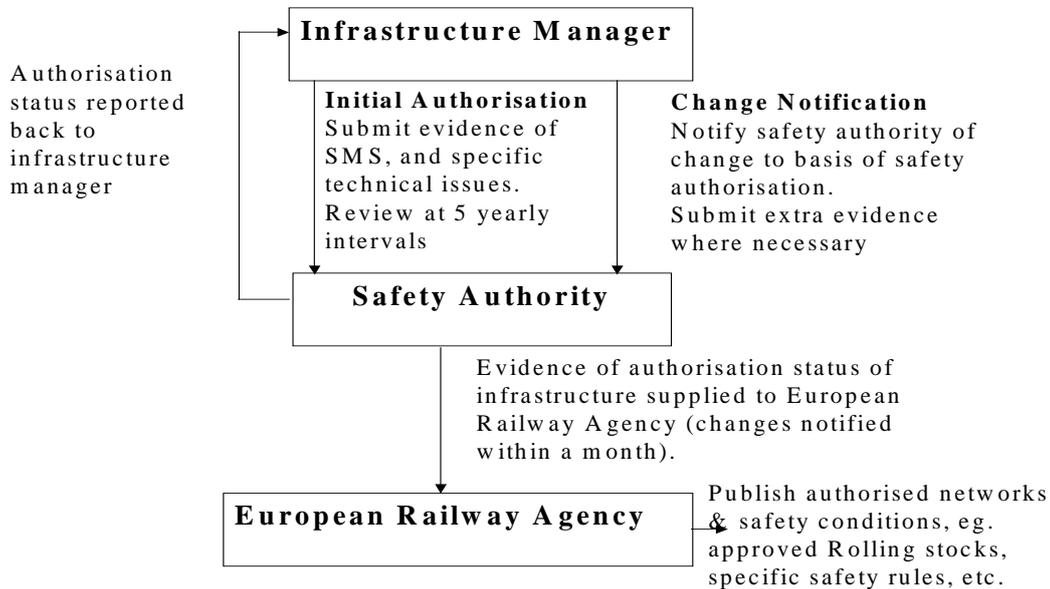
Figure 3: Safety Authorisation Information Flow for Infrastructure Managers

The IM's safety authorisation must be renewed, at the latest, every five years after the initial authorisation by the safety authority [Figure 3]. It is the responsibility of the IM to inform the relevant safety authorities, without delay, in the event of any substantial changes to the infrastructure, signalling or energy supply or to the principles of its operation and maintenance. Update to the safety authorisation may be required in the event of any such changes. If at any time a safety authority finds out that a IM no longer satisfies the conditions for a safety authorisation it shall revoke that authorisation, giving reasons for its decision. The safety authority may require that the safety certification be revised following substantial changes to the safety regulatory framework.

The safety authority shall inform the European Railway Agency within one month of the safety authorisations that have been issued, renewed, amended or revoked.

Documentation Submission and Reporting Requirements

Railway Undertakings – Safety Certification Submission

A RU will need to make a submission to the relevant safety authority, prior to the commencement of operations or prior to continuation of operations after a period defined by the safety authority (which will be no greater than 5 years). The submission will need to be structured to facilitate 'Part 1' and 'Part 2' level approvals.

The 'Part 1' submission will focus on the SMS aspects that are generic and therefore are applicable to the RU's operations regardless of the member state in which the operations are being undertaken. The SMS description produced should reference all of the safety processes and procedures, which make up the SMS.

The 'Part 2' submission will focus on the network specific aspects of the railway undertakings arrangements for ensuring safety. This section of the submission will therefore detail the specific requirements in place

Infrastructure Manager - Safety Authorisation Submission

In order to achieve safety authorisation, evidence should be supplied to the safety authority. This evidence should comprise two parts.

The first part of the submission should provide evidence that the IM's SMS is in place and is sufficiently robust for the organisation to effectively manage safety. The SMS description produced should reference all of the safety processes and procedures, which make up the SMS.

The second part of the IM's submission for Safety Authorisation should include the provisions of the IM to meet specific requirements necessary for the safe design, maintenance and operation of the traffic control and signalling system.

The relevant national safety authority will provide details of, and guidance on meeting, the pertinent specific requirements. Part1 and Part 2 IM submissions do not need to be identifiably separate submissions as unlike with the RU part 1 certification, the Part 1 IM authorisation will not need to be transferable between member states.

Audit by the Safety Authority

It is envisaged that the Safety Authority may undertake audit of infrastructure maintainers and railway undertakings in order to ascertain the appropriateness of arrangements described and the rigour with which reported processes/procedures are applied and stated requirements met. Therefore the submissions of these duty holders should provide the Safety Authority with a rigorous and thorough documentation set on which to base any subsequent audit activity. For example, in Norway they undertake RU audits every 2 or 3 years, and IM audits (in differing locations) more regularly. They intend to continue doing this even though this specific responsibility is not mandated in the Railway Safety Directive.

Infrastructure and Railway Undertaking Annual Report

All infrastructure managers and railway undertakings shall submit annual safety reports. These reports must be submitted to the relevant Safety Authority before 30th June in the year following the calendar year to which the report relates. The safety report shall include:

Information on how the organisations corporate safety targets are met;

The results of planned safety activity;

Development of national safety indicators;

Use of Common Safety Indicators as they relate to the business activity of the reporting organisation;

Evidence and results of internal auditing;

Any deficiencies or weaknesses with the organisations, their operations and infrastructure that may have been identified.

Railway Safety Authority Annual Report

Each year the safety authority shall publish an annual report concerning its activities in the preceding year and send it to the Agency by 30 September at the latest. The report shall contain information on:

- The development of railway safety, including an aggregation at Member State level of the CSIs laid down in Annex I of the directive;

- Important changes in legislation and regulation concerning railway safety;

- The development of safety certification and safety authorisation;

- Results of and experience relating to the supervision of infrastructure managers and railway undertakings.

The safety submissions of all railway undertakings and infrastructure managers operating on the same member state railway are to be made freely available between these parties. This is deemed to be important as knowledge of the safety management systems of each of these parties is necessary to enable them to interface appropriately on a given member state railway.

5.   CONCLUSION

The process of creating an internal European rail market has just started. A single market for railway services is envisaged as a means to improve the competitiveness of the railways with other modes of transportation. A key piece of the legislation implemented in response to this policy, is the Railway Safety Directive. One of the elements of the directive is the requirements that all Railway Undertakings (who run train services) and Infrastructure Managers (who maintain the railway network) in European members states implement a Safety Management System which meets certain criteria and is certified by the relevant National Safety Authority.

The introduction of the first railway package of European Directives creates a common framework for access to railway infrastructure, for licensing and safety certification and for allocation of railway infrastructure capacity. The second railway package, is designed to expand this approach by adding the safety aspects, extending the work on interoperability to new areas and putting it all into a comprehensive, clear and consistent context. The originally monolithic organisation of the railways has been divided into a number of independent organisations, some of which were redefined as commercial organisations and others as subsidiaries of the government. The reorganisation process has been a confused one, with several changes in the way in which the division of responsibilities was envisaged, particularly those relating to rule making, inspection and enforcement. This reorganisation process has caused new obstacles in the communication and cooperation between all parties concerned. The reorganisation makes it difficult to give a clear picture of current good practice and of the division between problems, which are structural, and those, which are caused by the transition process. According to the Railway Safety Directive, infrastructure managers and railway undertaking have the responsibility of ensuring safe railway operations. These areas are to be developed and investigated further in order to refine the existing national solutions and safety culture through best practices and to rich a common understanding.

The SAMNET project achieved essential milestones towards the competitive and safe European rail system by developing key elements regarding the implementation of the safety directive. The SAMNET experts debate and the consultations with different other groups show that the common safety targets, indicators and methods are closely linked and can not be treated separately. The SMS guidelines developed by the partners and disseminated was used for a case study to assess its applicability (e.g. Eurotunnel). These guidelines are in compliance with Railway safety directive requirements. The key success of implementing an efficient SMS is the collaboration between IM and RU for the maintaining safety of the overall system. Although IM is given an important role (see Article 9.3), there are no explicit provisions for them to check safety submissions of the RU who seek certificates for approval on their networks. Similarly, RU should have the opportunity to comment on the safety management system of the IM and of RU that could affect their operation. The economic aspect of the Safety Management System and Interoperability is a very important domain representing the business thinking relating also to the safety aspects in the reorganisation process of the European Railways. Although the railway system is the safest form of transportation, it needs to be changed in a business-oriented way, making it more attractive on the transport market. Nevertheless, this restructuring of the railways should be managed in a cost-effective way to include technical developments and the safety aspects of SMS.

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