

# Common Safety Targets and Common Safety Methods for the railway systems in Europe

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## First, a few words on the ERA Safety Unit

- Safety is one of the core activities of the European Railway Agency
- The Safety Unit within the ERA today consists of around 20 professionals
- The safety unit is responsible for the realisation of the measures laid on the Agency that are referring to Directive 2004/49/EC – “the Safety Directive”
- The work in the safety unit is divided into 4 different teams dealing with different subjects
  - ◆ Common Safety Methods and Common Safety Targets
  - ◆ Safety Certification and Authorisation
  - ◆ Monitoring of Safety Performance and Accident Investigation
  - ◆ National Safety Rules

- Opening the market for rail transport services and railway supply
- **preventing the sector from using safety as a barrier to market access or an excuse to resist change**

Some cornerstones in new EU law in relation to safety:

- ◆ Moving the railways from self-regulation to regulation by public authorities
- ◆ Introducing a framework for entry into the market for railway undertakings (licensing and safety certification)
- ◆ Creating a basis for mutual trust through the development of common approaches to safety
  - Transparency of safety data, CST, CSM, etc.

## What are Common Safety Targets?

following the definition of the Safety Directive:

“ ‘common safety targets (CSTs)’ means the safety levels that must at least be reached by different parts of the the rail system (such as the conventional rail system, the high speed rail system, long railway tunnels or lines solely used for freight transport) and by the system as a whole, expressed in risk acceptance criteria“

## What is the role of European Railway Agency in the development of CSTs?

The Agency is mandated to produce a recommendation on the first set of CSTs. It is planned that the first set will be adopted by May 2009.

The work is being performed together with representatives from different member states and sector organisations (Eg NSAs, UNIFE, EIM, CER)

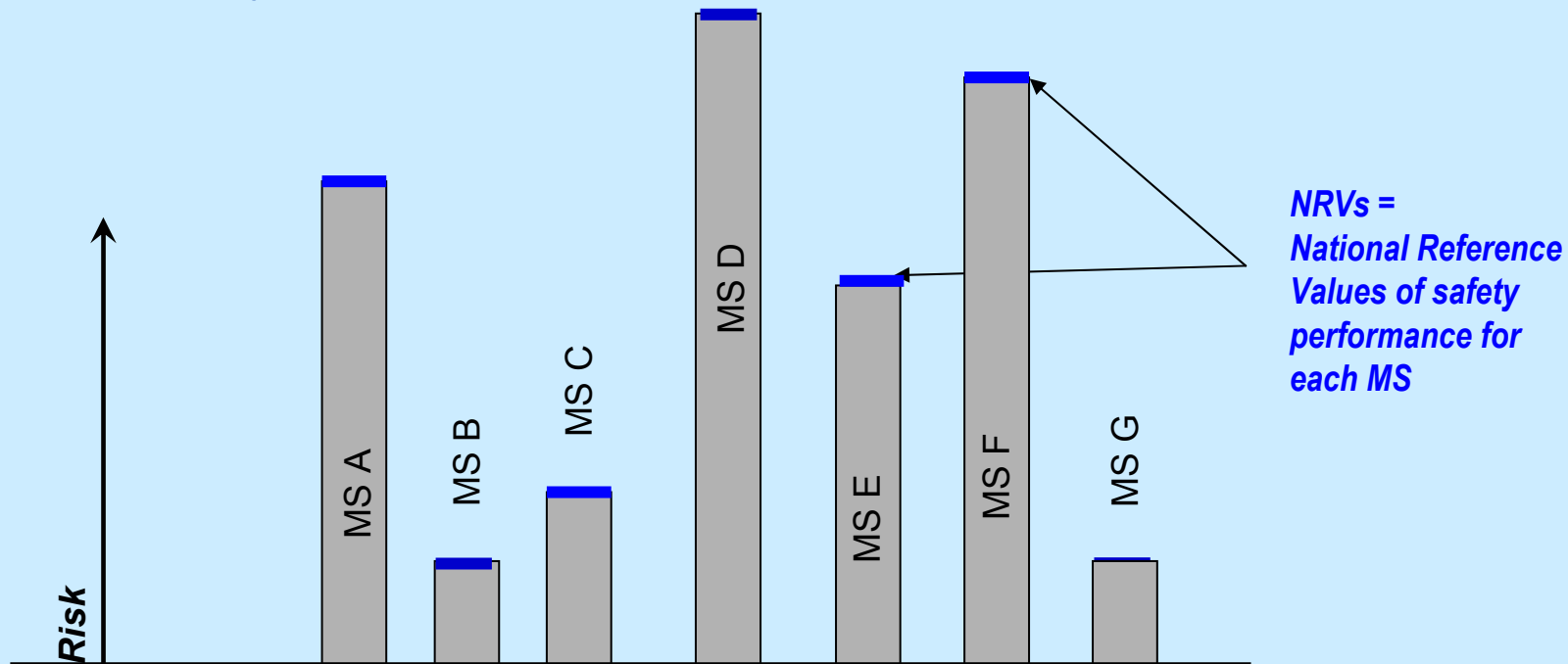
## What is the legal framework for CSTs?

The Safety Directive requires

- 1) that the first set of CSTs are based on examination of existing targets
- 2) that it is ensured that the current level of safety is not reduced in any member state
- 3) That the CSTs are developed as risk acceptance criteria for
  - a) individual risk for passengers, staff, level crossing users, unauthorised persons on railway premises and others
  - b) societal risks

The requirements to base CSTs on current safety performance makes it obvious to study accident statistics of member states

As a baseline, National Reference Values (NRVs) for the CSTs need to be created based on the safety performance in each of the member states to satisfy the need to ensure that the safety performance is not reduced in any member state.



## Common Safety Targets – Definition of NRVs

| <i>Category at risk</i>                  | <i>Preferred complete formulae</i> |   | <i>Preferred scaling factors</i>          |
|--|------------------------------------|---|---|
| Passengers                               | NRV 1.1                            | Number of pax Fatalaties and Weighted Injuries (FWIs) per year arising from significant accidents / n. of passenger train*km per year | Passenger train*km per year               |
|  | NRV 1.2                            | Number of pax FWIs per year arising from significant accidents / n. of passenger*km per year  | Passenger*km per year                     |
| Employees                                | NRV 2                              | Number of employee FWIs per year arising from significant accidents / n. of train*km per year   | Train*km per year                         |
| Level crossing users                     | NRV 3.1                            | Number of level-crossing user FWIs per year arising from significant accidents / [(n. of Train*km per year * N of LCs)/ Track-km]     | (Train*km per year * N of LCs) / Track-km |
|  | NRV 3.2                            | Number of level-crossing user FWIs per year arising from significant accidents / n. of train*km per year                              | Train*km per year                         |
| Others                                   | NRV 4                              | Yearly number of FWIs to persons belonging to the category “others” arising from significant accidents / n. of train*km per year      | Train*km per year                         |
| Unauthorised persons on railway premises | NRV 5                              | Number of FWIs to unauthorised persons on railway premises per year arising from significant accidents / n. of train*km per year      | Train*km per year                         |
| Whole society                            | NRV 6                              | Total number of FWIs per year arising from <i>SIGNIFICANT ACCIDENTS</i> / n.of train*km per year                                      | Train*km per year                         |

The analysis of safety performance have already highlighted some important aspects affecting the work in setting up CSTs

The available official data ( EUROSTAT and later CSI from 2007) is very scarce!

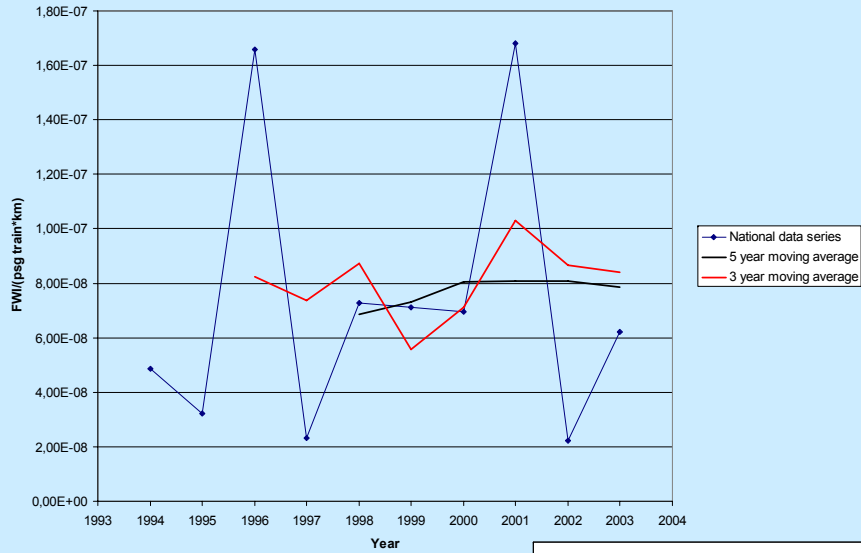
- Official accident data will only be available for 3-4 years.
- Truly harmonised statistics will only be available for maximum 2 years when the recommendation will have to be delivered.
- This situation creates rather large problems in creating statistically significant values for the NRVs – too few events and very large annual fluctuations.

There appears, based on a first analysis of single years, to be rather large differences in the safety performance between countries! These differences will probably only partly be explained by annual fluctuations.

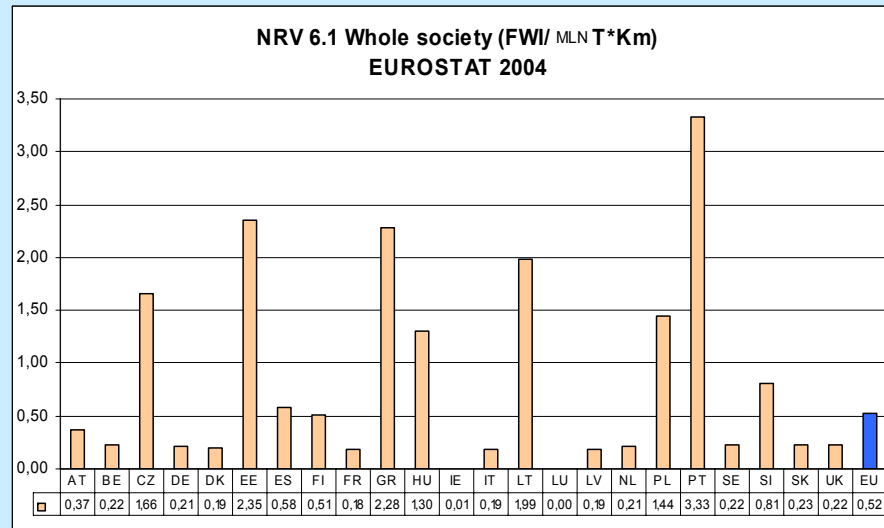
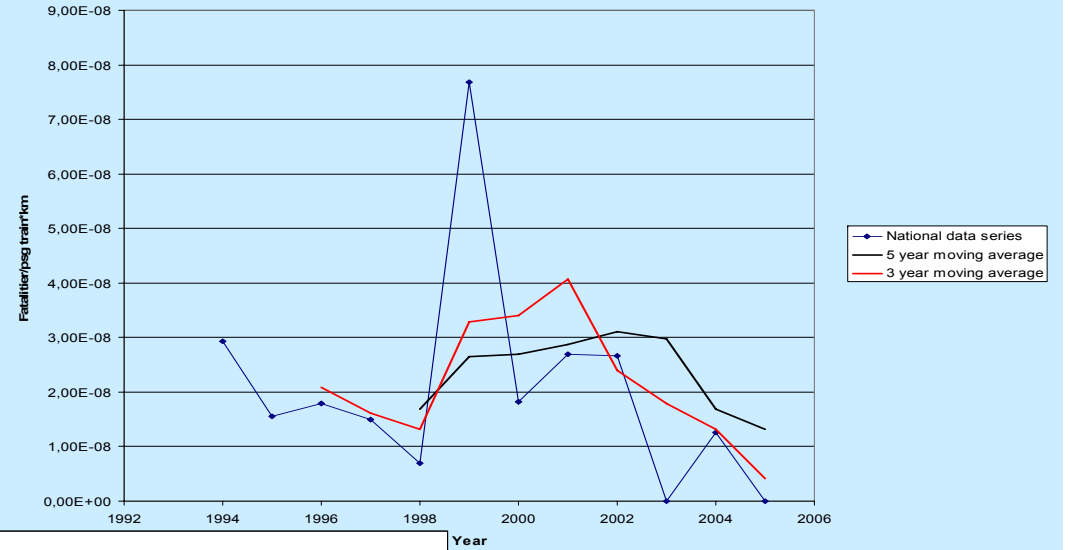


# Common Safety Targets – performance variations

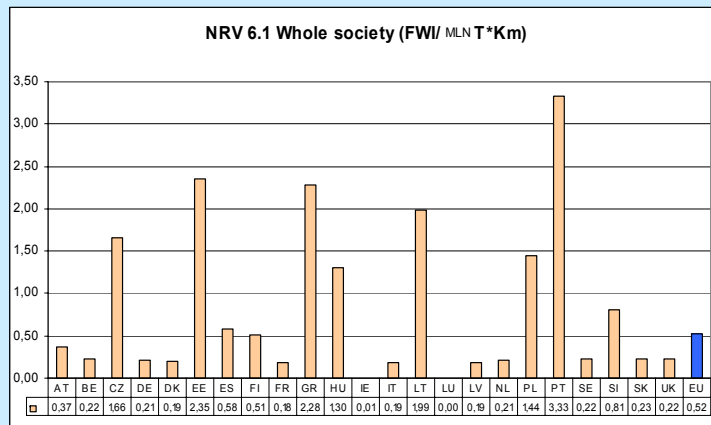
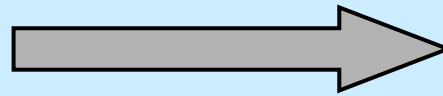
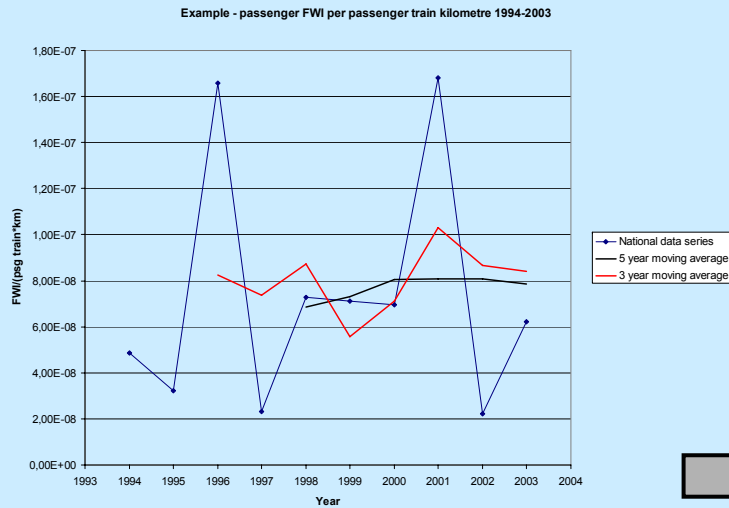
Example - passenger FWI per passenger train kilometre 1994-2003



Example - passenger risks fatalities per passenger train kilometre 1994-2005



The important task for the nearest future is to figure out a way to develop:



Common Safety Target valid for all Member States

NRVs that are sufficiently robust to well represent the safety performances of the MSs over time

A methodology to assess the annual variability effects and account for this in the enforcement of the CSTs (eg for example range or tolerance)

## How do we go from NRV to Common Safety Targets?

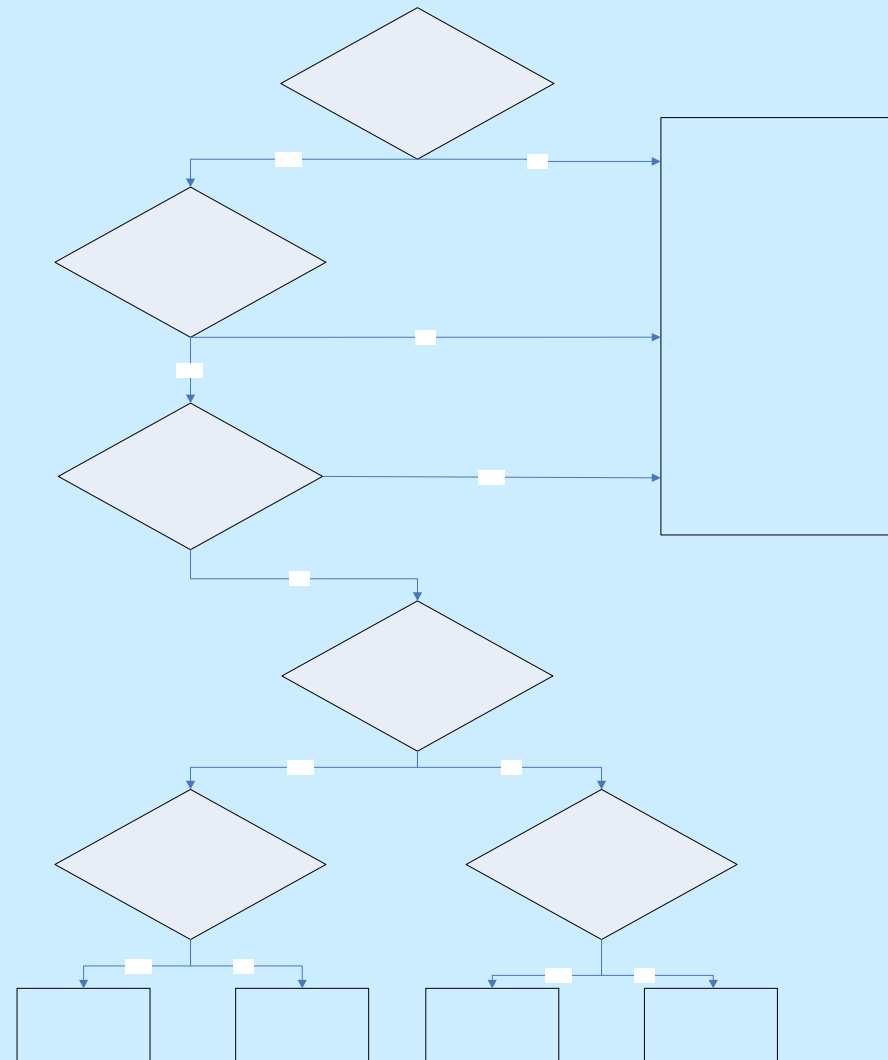
Given the differences in safety performance it is of course difficult to define a truly common safety target that is achievable for all MSs and also satisfies the prerequisite that the safety level should not be reduced in any MS.

Most likely option currently for the 1st set set of CSTs: set the level of CSTs to that of the worst performing country for each category of CSTs, with the requirement to keep at least level of NRVs for each MS

## What are the most crucial next steps?

- 1) Overcome the problem of statistical fluctuations by analysing more data and finding a solid approach to averaging and smoothing that will create as reliable NRVs as possible.
- 2) Develop a method for assessing the achievement of CSTs

- A model for assessing achievement in 4 or 5 steps is being developed.
- This model takes in to account:
  - First of all whether the NRV has been met in the MS.
  - If not, the magnitude of the deviation.
  - Presence of single high consequence events that can explain the deviation.
  - The safety trend, both in terms of fatalities and number of accidents.
- The aim is to have a framework that allows us to be significantly certain about a deteriorating safety before issuing “warnings” or “red cards” to MSs.
- In simulations, the model produce “red cards” in around 5 % of the assessments.



The fulfilment of the Common Safety Targets are directed to Member States, not specifically to railway operators, nor to suppliers!

CSTs for risks that are not entirely under the control of railway operators (eg level crossing risks, unauthorised persons on railway premises) will not fall solely on railway operators to handle.

The impact of the introduction of the first set of CSTs will most likely be rather limited.

An impact analysis will be performed for the implementation of the CSTs. However, for the first set of CSTs it can not be foreseen that the introduction will impose severe requirements on improvements to member states.

The first set of CSTs will be followed by a second set

These will be more evolved and based on the experiences from the first set of CSTs.

## What are Common Safety Methods?

Following the definition of the Railway Safety Directive 2004/49/EC :

*“Common Safety Methods (CSMs) are the methods to be developed to describe how safety levels and achievement of safety targets and compliance with other safety requirements are assessed“*

Two types of methods:

- *Ex-post assessment of safety performances describing the achievement of CSTs through the use of CSIs – Statistical methods*
- *Ex-ante assessment of safety levels and compliance to safety requirements based on predictive risk assessment*

First type of methods dealt with by the CST working group.

Recommendation will be delivered in February 2008 (**first technical report ready in September 2007**) – First delivery of CSIs within annual reports for 2006 by NSAs available by end of September 2007.

→ **Topic for the mid-term review of the CSM mandate**

### What is the nature of the foreseen Common Safety Methods?

According to Art. 6, §3 of SD, the CSMs should elaborate and define :

- a) **Risk Evaluation and Assessment Methods (1<sup>st</sup> Set) → CSM Recommend.**
- b) methods for assessing conformity with requirements in safety certificates and safety authorisations (**2<sup>nd</sup> Set of CSM – SafeCert – Mandate already received**)
- c) as far as they are not yet covered by TSI's, methods to check that structural subsystems ... are operated and maintained in accordance with the relevant requirements (**2<sup>nd</sup> Set of CSM – To be discussed**)

**Definition for Risk Assessment :** the overall iterative process comprising the systematic use of all available information to identify and rank the hazards, to estimate the risk and to determine whether the tolerable risk has been achieved (*evaluation*) (ISO)

### The strategy for “CSM Recommendation for Risk Assessment” :

- Leave some freedom to each organisation to use their already approved Risk Evaluation and Assessment Methods → Common principles
- Privilege the use of and reference to standards → Suggestions of Risk Assessment “tools” will be done in a “Guidance of Use” document to be issued alongside the recommendations
- The new structure of the Railways implies that all activities at the interfaces between different organisations have to be managed carefully → Clear identification of the different actors responsibilities and scope enlarged to the Risk Management process used at the interfaces
- It is necessary to harmonise the evidences necessary for the NSA to accept a new or a modified system → Scope enlarged to the Risk Management process used to assess safety requirements and their compliance in order to deliver safety approval

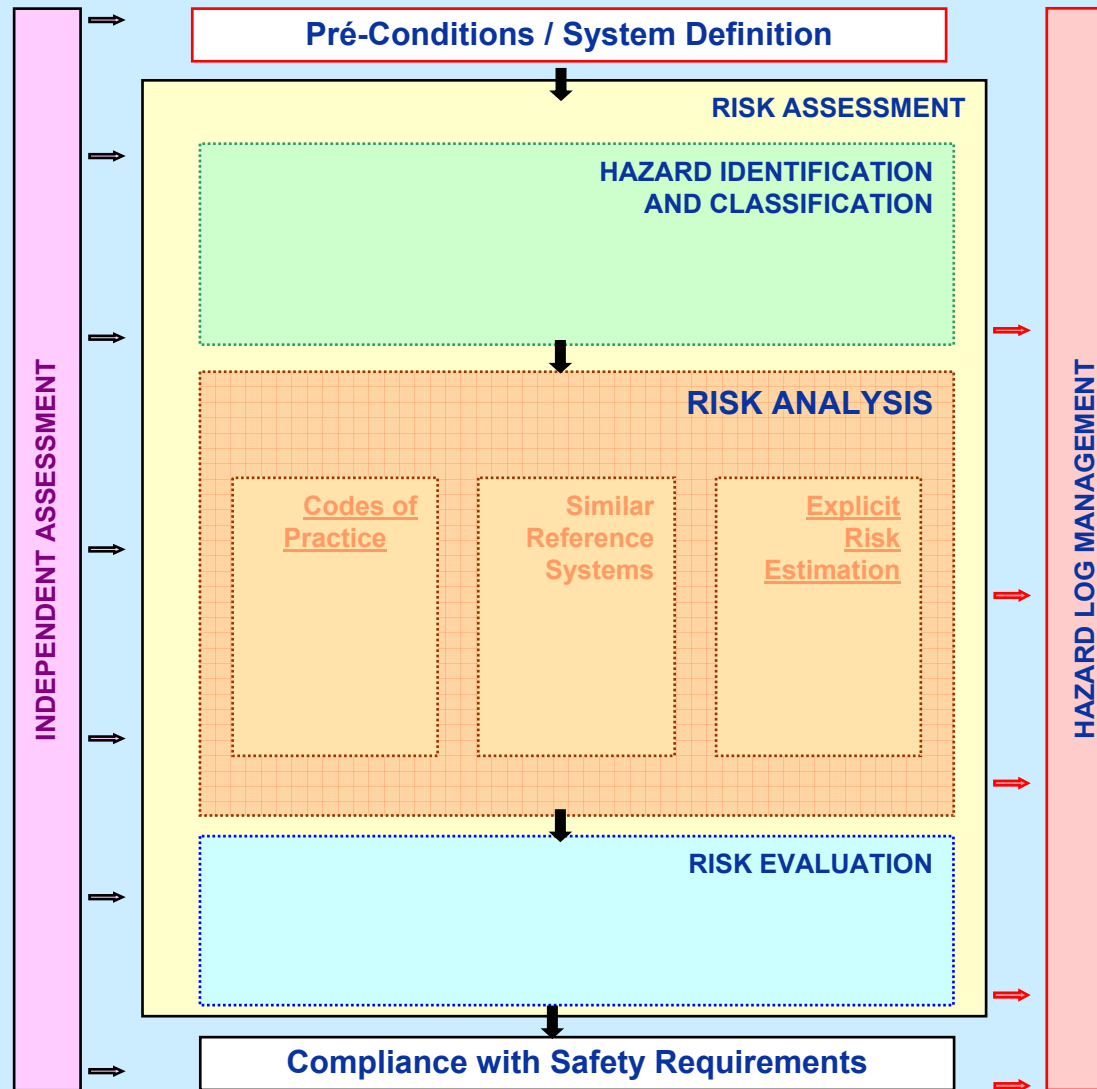


More specifically, Risk Assessment methods shall apply to assess predicatively the safety of **substantial changes** of the Rail System in the Member States.

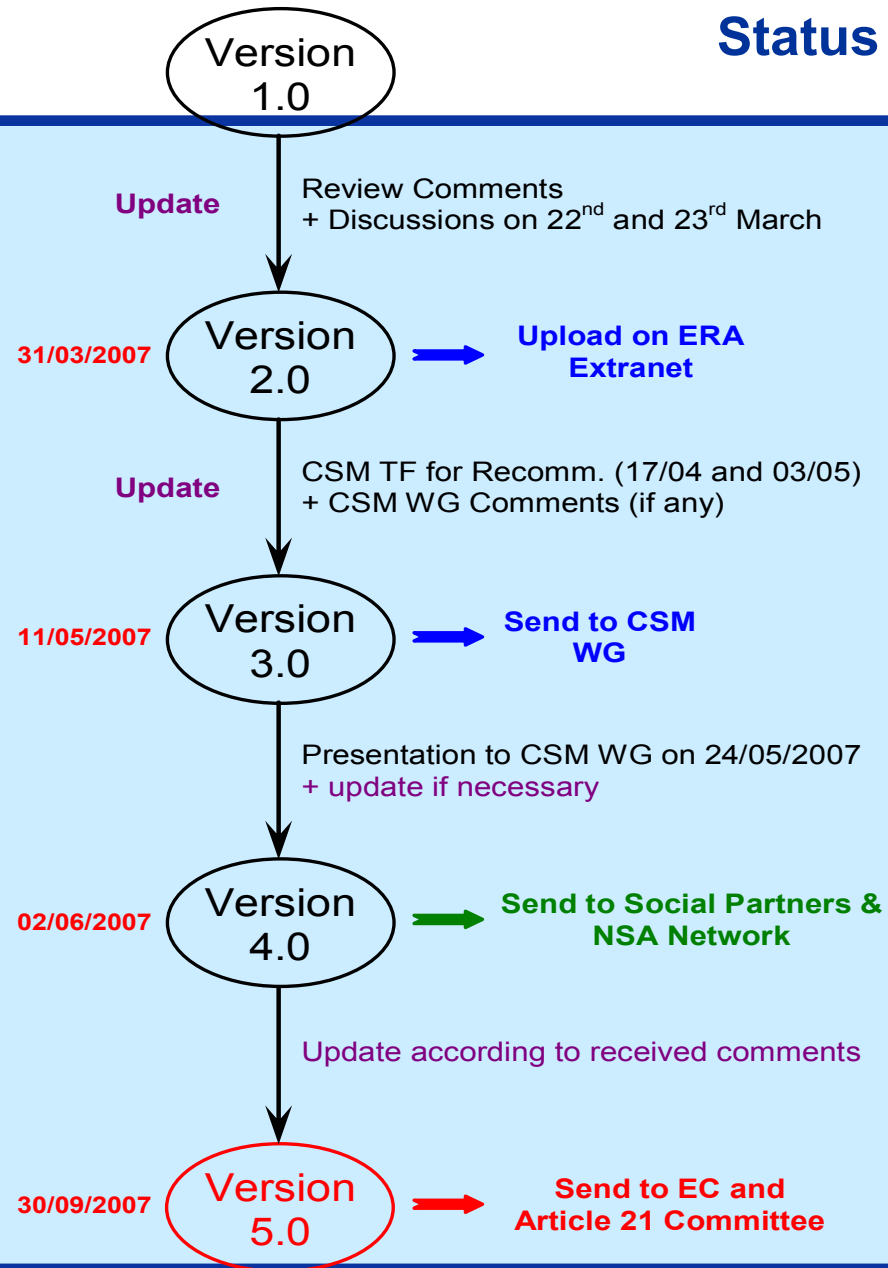
Changes could be either:

- Construction of new lines or significant change of existing lines
- Introduction of new and significantly modified technical systems or products
- Operational changes (such as new or significantly modified operational rules and maintenance procedures)
- Organisational significant changes within RU/IM organisations

Basically, the CSMs that are being developed for the first set apply to all changes or introductions that might require safety approval by National Safety Authorities (including Sub-Systems covered by TSI )



- Agency started to draft the CSM Recommendations in September 2006
- It was discussed and further developed with a Taskforce from CSM WG
- Version 1.0 was then distributed to WG Members for Review
- More or less 400 comments received from:
  - 11 NSA on 14
  - CER, EIM and UNIFE (Railway Organisations)
- Formal Agencies' replies to all these comments sent to the authors
- Telephone conversations to identity the points to be discussed at WG Meeting (22<sup>nd</sup> and 23<sup>rd</sup> March 2007) (Major Open Topics)
- Review one by one of these different topics during WG Meeting in order to find jointly a consensus



- Major “open” points in “1<sup>st</sup> Set of the CSM Recommendations” to be dealt with by 3 Taskforces till end of 2007
  - Substantial Changes
  - Negligible Hazards and Risk Acceptance Criteria
  - Role and Responsibilities of Assessment Bodies (NSA, ISA, NOBO)
- All these issues are not expected to be solved for the 1<sup>st</sup> Set of the CSM Recommendations
- Harmonisation expected for 2<sup>nd</sup> Set of the CSM Recommendations

**These points should be part of the mandate for the second set in addition with the article 6 §3 c of the SD**