

REVIEW OF DATA QUALITY AND APPROACH OF THE AGENCY  
ANNUAL REPORT ON SAFETY

# Proposal for Common Occurrence Reporting Regimes and Systems Including Taxonomy

European Railway Agency

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## Table of contents

1	EXECUTIVE SUMMARY .....	1
1.1	Conclusions	1
1.2	Supporting Argumentation	1
2	OVERVIEW OF THE PREVIOUS TASKS.....	2
2.1	Task 1 – Assessment of Existing National Occurrence Reporting Regimes and Systems	2
2.2	Task 3 – Impact Assessment on the Proposal for a Common Occurrence Reporting System	3
3	MORE DETAILED DESCRIPTION OF THE RECOMMENDED PROPOSAL .....	8
3.1	Overview	8
3.2	Comprehensive National Occurrence Reporting Regime	8
3.3	EU Level Common Occurrence Reporting – Consolidated or Metadata	16
3.4	Taxonomy	19
4	PROPOSED IMPLEMENTATION .....	22
4.1	Preconditions for Success	22
4.2	Modification to Directive 2009/149/EC	22
4.3	Production of Guidance	23
4.4	Convene a User Group under the Chairmanship of the Sector	23
4.5	Establish a Common Reporting Form	23
4.6	The Creation of an EU Level Database	23
4.7	Ongoing Management	23
4.8	Establish a Historical Record	23
5	CONCLUSIONS .....	25
	APPENDIX ONE - DEFINITIONS.....	26
	APPENDIX TWO – PROPOSED TAXONOMY .....	29

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# 1 EXECUTIVE SUMMARY

## 1.1 Conclusions

Building on the work presented in the task 1 and 3 reports this task 4 report discusses the commonality of reporting found at a national level across the EU, Norway, Switzerland and Channel Tunnel which could form the basis of a common occurrence reporting regime. It further discusses a suitable objective for such a regime that would be appropriate at an EU level and finally describes an initial taxonomy for such a regime.

The central proposal is that all Member States' National Occurrence Reporting regimes are brought up to a minimum standard matching the definition of a comprehensive occurrence reporting system. These National Occurrence Reporting systems, respecting the principle of subsidiarity, may be of varying scope but should include the ability to record a core set of information relating to the accident categories characterised as Potentially High Risk Train Accidents. These are as defined in the existing Common Safety Indicator (CSIs) Guidance<sup>1</sup> and should be recorded for significant accidents and for all other accidents resulting in harm (major injuries and minor injuries). Benefit will also derive from reports of near miss incidents that cause no harm but which under other circumstances would have caused a significant accident and it is recommended that these too are recorded in the same occurrence reporting system.

A subset of the information on Potentially High Risk Train Accidents should be provided in a common format to an EU level Common Occurrence Reporting regime as meta data.

A recommended implementation plan is presented together with an initial taxonomy for the Common Occurrence Reporting regime at the EU level.

## 1.2 Supporting Argumentation

The task 3 report provided an estimate of the number of occurrences that should be reported annually across the EU, Norway, Switzerland and Channel Tunnel if all Member States operated a comprehensive National Occurrence Reporting regime. Those Member States approximating to this at present were compared in their scope of reporting to the requirements in the Common Safety Indicators (CSIs). It was observed that their scope of reporting was against the same accident categories as for the CSIs (broadly high risk train accidents), but whilst the CSI reporting is only against significant accidents these Member States extended the definition of a reportable accident to lesser levels of harm such as minor injuries or near misses (no actual harm incurred). This then provides a suitable means of simply extending the current CSI reporting regime to support more comprehensive occurrence reporting in the Member States and at a common EU level.

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<sup>1</sup> Implementation Guidance for Common Safety Indicators Annex 1 to the Directive 2004/49/EC as Amended by Directive 288/2014/EC, ERA-GUI-02-2015

## 2 OVERVIEW OF THE PREVIOUS TASKS

This report builds on the work done in the previous two task reports (tasks 1 and 3) that are relevant to occurrence reporting and, in accord with the impact assessment presented in task three, presents a proposal for a common occurrence reporting regime at a European level. This section summarises the relevant work from the previous reports.

### 2.1 Task 1 – Assessment of Existing National Occurrence Reporting Regimes and Systems

The task 1 report described the various features of the existing national occurrence reporting regimes. This revealed that all regimes have a common core of data collected; that predominantly reflects the requirements of reporting required for the Common Safety Indicators. A simple excel tool has been developed to capture and compare the data collected, so that commonly captured data fields can be identified. Beyond this the scope of reporting varies extensively across the Member States.

The task 1 report additionally reviewed the occurrence reporting systems for railways in other jurisdictions and for other transport modes and in the oil/gas sector. This revealed the fact that in order to have any benefit an occurrence reporting system requires an objective linked to safety and risk management and this objective determines the taxonomy of the occurrence reporting system. Occurrence reporting systems not associated with an objective often result in data graveyards, i.e. systems that capture data for no clear purpose and ultimately are not utilised.

Two approaches for structuring an occurrence reporting system were then described in the Task 1 report. A top down approach is one in which the users of the occurrence reporting system agree an objective and this is then used to drive a taxonomy. This creates good alignment between the taxonomy/database and the objectives for it, but can be expensive in that previously uncollected data may be needed. The other means is a bottom up approach in that a common occurrence reporting system collates commonly reported data at a national level. This is inexpensive as data is already collated but provides potentially poor alignment to any objective. The task 1 report concluded that a hybrid approach, both top down and bottom up, would provide a suitable balance between ease of reporting/cost and alignment to objectives.

## 2.2 Task 3 – Impact Assessment on the Proposal for a Common Occurrence Reporting System

The task 3 report described the categorisation of the national occurrence reporting systems into one of three categories:

**Table 1 – The Description of the Three Categories of National Occurrence Reporting Regime**

<b>Basic Occurrence Reporting</b>	Occurrence reporting is largely restricted to current EU legislative requirements and confined in scope to the reporting requirements of the Common Safety Indicators and the need to notify the NIB of serious accidents.
<b>Intermediate Occurrence Reporting</b>	National Occurrence Reporting goes beyond EU legal minimum requirements, but is either not fully comprehensive or not clearly a part of a wider process to turn occurrence reporting into information and then mitigating action.
<b>Comprehensive Occurrence Reporting</b>	The national occurrence system extends into a comprehensive system for reporting accidents, incidents, and near misses. It is a part of a defined process for turning data into information and then subsequent mitigating action as a part of an holistic approach to the management of railway safety at the Member State level.

**Table 2 –The number of National Occurrence Reporting Regimes in each Category Identified in Table 1**

<b>Occurrence Reporting Regime</b>	<b>Number of Member States</b>
Basic	11
Intermediate	8
Comprehensive	10

Statistically significant improvements in safety performance were found in the Common Safety Indicator data for passenger and employee safety and level crossing users for those Member States employing a comprehensive reporting regime compared to those using an intermediate or basic reporting regime.

This benefit was monetised to create a financial value in Euros against which the costs of a common occurrence reporting regime could be compared. The benefit was associated with bringing each of the Member States up to a comprehensive level with a further benefit of 10% judged to be realisable at an EU level as a result of Common Occurrence Reporting at an EU level.

Five proposals were then developed (see table 3) which were modelled in the impact assessment:

**Table 3 – The Description of the Five Proposals for Common Occurrence Reporting Regimes Considered Together with Their Impact on the Identified Deficiencies in the Current Regime from the Task 3 Report**


	<b>The collection of occurrences is not optimal</b>	<b>Suboptimal data integration</b>	<b>Lack of occurrence analysis at MS level and at European level and of appropriate corrective and preventative actions</b>
<b>0. Baseline</b>	Current occurrence reporting regimes vary greatly in scope and comprehensiveness. Currently it is judged that ten Member States operate a comprehensive occurrence reporting regime, with eleven basic and eight intermediate.	Existing reporting forms, taxonomies and databases are incompatible. Data cannot be easily extracted (indeed most databases are confidential) and compared across the EU, or even between two adjacent Member States.	Occurrence analysis is currently possible within ten Member States only and to a very limited extent (the CSIs) at an EU level. Risk based regulation and decision making are not a realistic prospect.
<b>1. Occurrence reporting at a national level</b>	The provision of guidance and the demonstration of benefits encourages all Member States to establish a National Occurrence Reporting regime. This is expected to take several years to achieve occurrence reporting across all Member States as it competes with other national priorities.	A standard reporting form and database taxonomy is provided in the guidance, but Member States are still free to vary this to address local or national concerns. Variability in the quality and completeness of data can still be expected. Existing databases will be difficult to adapt to the new format.	Occurrence analysis is encouraged at a national level, but is increasingly difficult at an EU level due to remaining differences in national taxonomies and data quality issues as each Member State is responsible for checking their own data. There is the potential to miss actions based on learning from other Member States.

	<b>The collection of occurrences is not optimal</b>	<b>Suboptimal data integration</b>	<b>Lack of occurrence analysis at MS level and at European level and of appropriate corrective and preventative actions</b>
<b>2. Occurrence reporting at an EU level</b>	The provision of guidance and the demonstration of benefits encourages all Member States to establish a National Occurrence Reporting regime, which provides a further cascade of occurrence reporting to the Agency. This is expected to take several years to achieve occurrence reporting across all Member States as it competes with other national priorities.	A standard reporting form and database taxonomy is provided in the guidance as a means of supporting the EU level occurrence reporting. This helps to standardise EU level reporting, but Member States are still free to vary this to address local or national concerns. Variability in the quality and completeness of data can still be expected. Existing databases will be difficult to adapt to the new format.	Occurrence analysis is encouraged at both a national level and an EU level. EU Level analysis cannot progress effectively until all Member States are contributing to the EU level occurrence reporting and to a similar level of consistency. EU level data validation can help drive this consistency, but not until all Member States utilise the system.
<b>3. Mandatory occurrence reporting at a national level</b>	National occurrence reporting regime is established in each Member State to a common format and structure. Those Member States with existing comprehensive regimes are forced to modify them at additional cost.	Data entry to the national occurrence reporting system is to a common format and optimal. Cascading of this data to an EU level is done at regular intervals (e.g. monthly) and is facilitated by all occurrence data being to a common format. Validation of data is done at a local level in the Member State with the further verification being undertaken by the Agency at an EU level.	Occurrence analysis at Member State level is undertaken in real time and that for EU level on a regular basis, but sufficient for risk based regulation and risk based supervision to be enacted.



	<b>The collection of occurrences is not optimal</b>	<b>Suboptimal data integration</b>	<b>Lack of occurrence analysis at MS level and at European level and of appropriate corrective and preventative actions</b>
<b>4. European centralised approach</b>	All occurrence reports are provided directly to the Agency. The use of a standardised form allows information to be structured in a common manner. Data is provided in real time. This would represent a large number of occurrences coming in centrally which may impact the ability to optimally collect occurrence reports. Agency is also not well placed to understand if a serious occurrence has not been reported as, unlike an NSA, it has no supervisory activity in that Member State.	As the Agency is one step removed from the Member State in which the occurrence occurred then the validation of data is more difficult as missing or incomplete data has to be sought from the reporter by the Agency. The Agency may lack the local contacts in the Member State to easily question or probe missing data.	Occurrence analysis at the EU level is undertaken in real time. Risk based regulation and supervision is possible, but may be impacted by data quality issues.
<b>4.1 European centralised approach; meta data</b>	Summarised or meta data is provided directly to the Agency. The use of a standardised form allows information to be structured in a common manner. Data is provided at periodic intervals and validated by the Member States.	The Agency is reliant upon the Member States for proper reporting and analysis. The granularity of reporting and volume of data is less than the full option 4 but it is greater than the level of reporting seen for the CSIs currently.	Occurrence analysis at the EU level is undertaken at regular or periodic intervals. Risk based regulation and supervision is possible, but may be impacted by data granularity.

Occurrence reporting by itself cannot improve railway safety as it needs to be a part of a wider regulatory process of analysing and acting upon the data. As such it was assumed that 10% of the



identified safety benefit was attributable to the occurrence reporting. On this basis it was option 4.1, a European centralised approach based on meta data that was most beneficial in terms of the impact assessment.

This approach first establishes a comprehensive national occurrence reporting regime in each Member State. These National Occurrence Reporting regimes may vary in scope and extent, but should all report a core set of occurrence data in condensed form to an EU level Common Occurrence Reporting regime as consolidated or meta data. This will be described in further detail in section 3.

## 3 MORE DETAILED DESCRIPTION OF THE RECOMMENDED PROPOSAL

### 3.1 Overview

The task 1 report "Assessment of Existing National Occurrence reporting Regimes and Systems" advocated a hybrid approach to the development of a Common Occurrence Reporting system. That is both a top down approach whereby an objective is set that drives the development of the taxonomy of the reporting system and a bottom up approach that establishes similarities between reporting systems that can form a common core of reported occurrences. The bottom up approach examining commonalities is considered first.

### 3.2 Comprehensive National Occurrence Reporting Regime

#### 3.2.1 Bottom Up Approach - Commonalities and Differences between National Occurrence Reporting Regimes

The ultimate finding from the impact assessment is that there is significant safety benefit achievable at a Member State level through all Member States adopting a comprehensive occurrence reporting system. The task 1 report revealed that whilst there were substantial similarities between some elements of the national occurrence reporting systems, largely those associated with the Common Safety Indicators, there were also significant differences in terms of scope<sup>2</sup>. This is seen most visually in the number of annual occurrence reports in Figure 1 below, which indicates the differences in scope of reporting as seen in the number of reports collected annually.

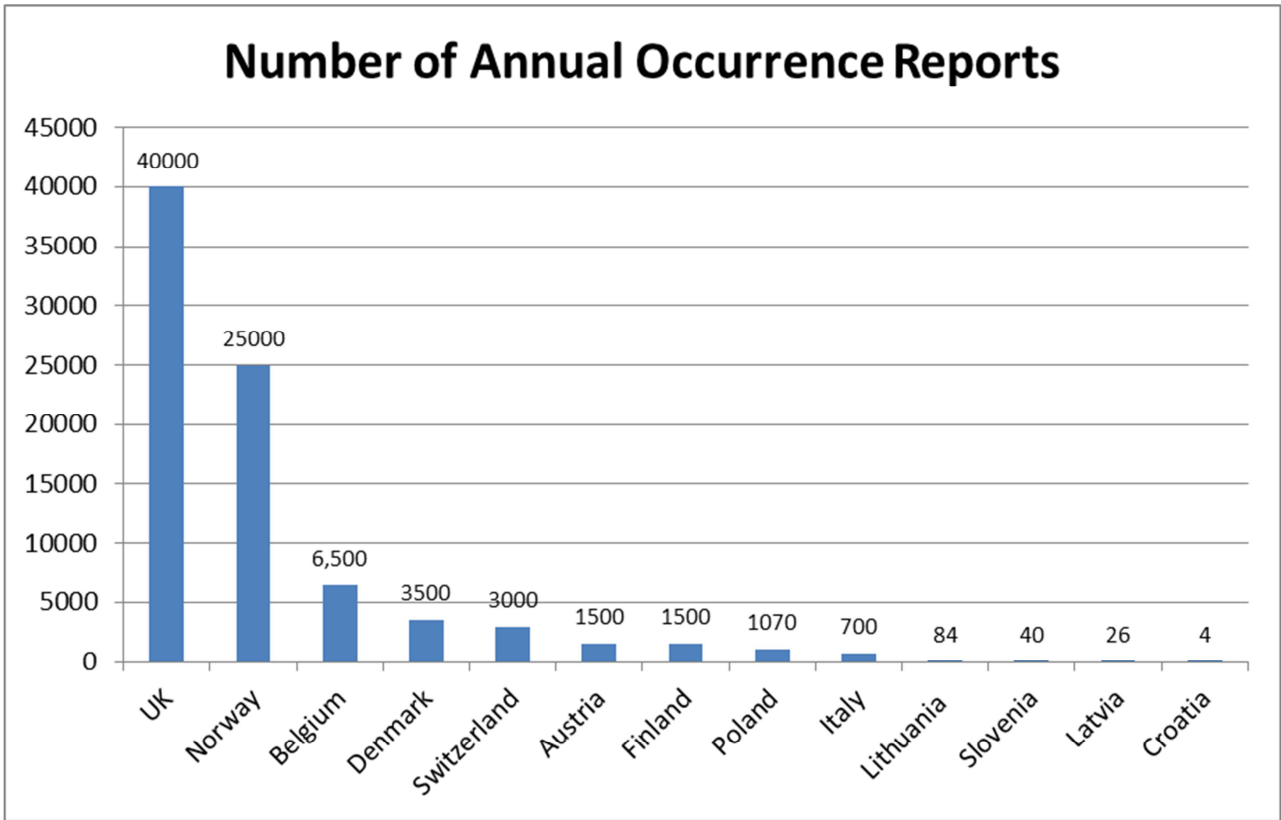
The thirteen Member States listed in the figure are those who provided data on the volume of reporting in their National Occurrence Reporting system. It includes seven of the ten Member States that operate what is judged to be a comprehensive occurrence reporting regime. The three comprehensive regimes missing from Figure 1 are two Member States whose comprehensive occurrence reporting is based upon the reporting system of the Infrastructure Manager and one Member State whose comprehensive occurrence reporting regime is being modified and hence no data on the volume of reporting is available.

In order to determine which NORs will provide the best basis to form a common core of reported occurrences a two part filtering process has been conducted:

- Member States have been removed that have no National Occurrence Reporting regime (those using the Infrastructure Manager's reporting system or those that simply have no database of events). This applies to Greece, Luxembourg, Spain, Ireland, Slovakia, Portugal and Hungary.
- From the remaining 22 Member States there are 13 that have provided data on the annual volume of reporting. It is appropriate to filter on the annual volume of occurrences reported because this is the basis of the impact assessment developed in Task 3. Any assessment of commonality or difference that did not consider the volume of reporting would invalidate the impact assessment.

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<sup>2</sup> UK figure has been taken as half the annual reporting into the GB industry Safety Management Information System to account for occurrences that are below the significance threshold for reporting in the National Occurrence Reporting Regime.



**Figure 1 – The Annual Number of Occurrence Reports in Selected Member States**

The volume of reporting varies considerably within the 13 Member States for whom data is available. Currently some Member States report only those occurrences in scope of the National Investigation Body, others extend this to train accident risk and near misses, and others to occupational or workforce accidents and near misses. Given the principle of subsidiarity it does not seem appropriate to force a Member State to stop collecting occurrence data that it currently sees benefit in collecting. Thus a levelling down approach is not recommended.

Within the differing national occurrence reporting regimes there are some that appear to be collecting the volume of occurrences that would be expected from a comprehensive reporting system. The scope and extent of these can thus provide a basis for assessing whether a core of reporting can be defined.

The impact assessment estimated that a migration of all Member States to a comprehensive reporting regime would require 300,000 occurrence reports annually across the EU, Norway, Switzerland and the Channel Tunnel as compared to the estimated 118,000 collected today. When normalised per train km this brings all Member States up to the approximate level of 70 occurrence reports per million train-km. This is obviously an approximate average value as it depends not just on the scope and extent of the occurrence reporting regime but on the underlying safety performance of the railway (safety occurrences can only be reported if they occur) which varies between Member States and over time. Those Member States for whom data is available on the volume of occurrences collected per annum were compared to the expected reporting rate of 70 occurrences per million train-km as shown in table 4 below:

**Table 4 – For those member States Providing Data the Annual Number of Occurrences Reported and the Annual Number per Million train-km**

Member State	Annual Occurrences Reports	Annual Reported Occurrences per Million Train-km
<b>Norway</b>	<b>25000</b>	<b>300</b>
<b>United Kingdom<sup>3</sup></b>	<b>40000</b>	<b>70</b>
<b>Belgium</b>	<b>6500</b>	<b>68</b>
<b>Denmark</b>	<b>3500</b>	<b>56</b>
<b>Finland</b>	<b>1500</b>	<b>37</b>
<b>Lithuania</b>	<b>84</b>	<b>15</b>
<b>Switzerland</b>	<b>3000</b>	<b>14</b>
<b>Austria</b>	<b>1500</b>	<b>13</b>
<b>Poland</b>	<b>1070</b>	<b>7</b>
<b>Latvia</b>	<b>26</b>	<b>4</b>
<b>Slovenia</b>	<b>40</b>	<b>3</b>
<b>Italy</b>	<b>700</b>	<b>2</b>
<b>Croatia</b>	<b>4</b>	<b>0.2</b>

As stated above the approximate level of 70 occurrence reports per million train-km is an approximate one and for this reason a range from 10-110 occurrence reports per million train-km has been selected as a suitable target range for further analysis. Those Member States reporting the approximate value of occurrences within this range are UK, Belgium, Denmark, Finland, Lithuania, Switzerland, and Austria. Lithuania has subsequently been excluded because of the low level of absolute occurrence reports per annum, meaning that small annual variations could result in large variations in occurrences per million train-km. It is possible that other Member States collect occurrence reports to similar levels but data on the volume of reporting for them is not available and hence they are not included.

The scope of the reporting regimes found in these Member States then provides a useful basis for developing a harmonised common baseline for reporting, whilst allowing those Member States reporting a greater number of occurrences to continue to do so.

### 3.2.2 Details of Occurrence Reporting in the Selected Member States

The scope of the reporting within **Finland** is defined in national law as being:

*An accident means an unwanted or unintended sudden event or a chain of such events which have harmful consequences. Involved in an incident means an event that is not an accident, associated with the operation of trains and affecting the safety.*

Within **Belgium** it is defined as being:

<sup>3</sup> UK figure assessed as being half of the volume of reporting contained in the industry administered Safety Management Information System

*Notification of serious accidents; accidents and incidents which under different circumstances might have led to a serious accident; a leak or risk of a leak of hazardous material resulting in an evacuation or the triggering of the response plan; any event causing a total interruption of rail traffic on a line of over two hours.*

More specifically in **Denmark** the scope of reporting covers:

- 1. Collision*
- 2. Derailment*
- 3. Level crossing accident*
- 4. Injury caused by rolling stock in motion*
- 5. Train fires*
- 6. Damage > 1.2 million kr.*
- 7. Traffic delay > 6 hours*
- 8. Suicide*
- 9. Accident involving DG, as required by 1.8.5 of RID / ADR*
- 10. Precursors: broken rails, track defects requiring speed restriction or closure; signal failure; SPAD; broken wheels or axles*
- 11. Injuries: Passengers; staff (inc contractors); crossing users; trespassers*

In **Switzerland** the scope of reporting covers:

- 1. Accident: Event with death or serious injury or significant property damage (> CHF 100,000).*
- 2. Serious incident (e.g. threat) that would have led to an accident if safety measures had not been in place.*
- 3. Events with minor injuries.*
- 4. Suicides or suicide attempts.*
- 5. Major technical defect (e.g. engine damage, axle defect, broken rails etc.)*
- 6. Exceptional event (technical failure safety-related areas or deficient or faulty safety measures or safety issues due to human error).*
- 7. Hazardous event events under Section 1.8.5 RID.*
- 8. Sabotage, including bomb threats.*
- 9. Fires of vehicles and larger explosions of safety-related systems. Disturbances (e.g. natural*
- 10. Disasters, failure of power supply or safety systems causing operational interruption > 6 hours.*
- 11. Collisions of trains or shunting vehicles with:*
  - Other railway vehicles*

- Road vehicles
- Equipment of the infrastructure manager Obstacles (such as buffer) > =CHF 25,000.
- Animals > = CHF 25,000.

12. Train derailments or shunting

13. Cases in which at least one wheel of a train or a shunting leaves the rails.

14. Runaway of rail vehicles.

15. SPADS and other violations.

In the **United Kingdom** the reporting scope is:

- *Specified accidents and incidents. All fatalities and major injuries and those involving absence from work of over 7 days.*
- *National incident reporting is mandatory for "high risk defects". These are anything that has caused or had the potential to cause:*
  - a) *The death or injury of any person.*
  - b) *An accident to the rail vehicle itself.*
  - c) *An accident to any other rail vehicle, equipment or plant & machinery.*
  - d) *Damage likely to endanger the safety of:*
    - i) *Any person or animal*
    - ii) *Trains*
    - iii) *The infrastructure*
    - Iv) *The environment.*

*It includes the discovery of a deficiency in authorised documentation or systems that could, if implemented, cause a high risk defect as defined above.*

Finally in **Austria** the reporting scope is defined below:

*This legislation specifies the reporting of various accident and incident occurrence types. The legislation applies to all railway companies (Railway Undertaking and Infrastructure Manager) operating over:*

1) *Main and Branch lines*

2) *Connecting railway or sidings*

3) *Urban tramways*

*The reporting is to the NSA and NIB. The time to report is dependent on the severity of the accident.*

*Accidents with severe consequences should be reported immediately by telephone, others may be reported in writing the next business day or for those deemed least significant in terms of consequence they should be reported by the end of January as a summary of the previous calendar year.*

*The severity of the accident is determined by the presence of fatalities or serious injuries, if damage greater than €500,000 occurred or if "sensational" media coverage can be expected.*

- *Derailments*

- *Collisions*
- *Derailments or collision with engineering trains*
- *Shunting accidents (derailments and collisions)*
- *Level crossing accidents*
- *Fire and explosion*
- *Fatalities from the operation of rolling stock*
- *Unauthorised train movements*
- *Driving without an order*
- *Two trains in an occupied track section*
- *Runaway train*
- *Serious technical failures on infrastructure or rolling stock*
- *Passenger accidents at platforms*
- *Accidents to track workers*

Whilst commonality with the CSI reporting requirements is evident in these reporting regimes there is also variation in the scope of reporting. The CSI reporting requirements are summarised as:

- *Significant Accidents divided into the categories: train collisions, derailments, level crossing accidents, accidents to persons caused by rolling stock in motion, fires and others. An accident is significant if it involves one rail vehicle in motion and results in:*
  - *At least one fatality or serious injury (hospitalised for more than 24 hours)*
  - *Significant damage (including to the environment) of Euro 150,000 or more*
  - *Extensive disruption to traffic such that mainline train services are suspended for six hours or more.*

The CSI data are recorded in the ERAIL occurrence reporting system maintained by the Agency, the structure of which is designed around the reporting requirements for the CSIs. The differences between the occurrence reporting being undertaken in the selected Member States and the CSIs/ERAIL database are highlighted in table 5 below:

**Table 5 – The Difference in Scope of Occurrence Reporting Between the Baseline Case for the Common Safety Indicators and that in the Member States of Finland, Belgium, Denmark, Switzerland and Austria**

<b>Member State</b>	<b>Differences to CSI Requirements<sup>4</sup></b>
Finland	An accident means an unwanted or unintended sudden event or a chain of such events which have harmful consequences. Involved in the <b>incident</b> means an event that is not an accident, associated with the operation of trains and affecting the safety.

<sup>4</sup> Differences are highlighted in **BOLD** text




Member State	Differences to CSI Requirements <sup>4</sup>
Belgium	Notification of serious accidents; <b>accidents and incidents which under different circumstances might have led to a serious accident</b> ; a leak or risk of a leak of hazardous material resulting in an evacuation or the triggering of the response plan; any event causing a total interruption of rail traffic on a line of over <b>two</b> hours.
Denmark	<b>Injuries:</b> Passengers; staff (inc contractors); crossing users; trespassers
Switzerland	Accident: Event with death or serious injury or significant property damage (> CHF 100,000). <b>Serious incident (e.g. threat) that would have led to an accident if safety measures had not been in place.</b> <b>Events with minor injuries.</b>
United Kingdom	<i>National incident reporting is mandatory for "high risk defects". These are anything that has caused <b>or had the potential to cause</b>:</i> <ul style="list-style-type: none"> <li><i>a) The death or injury of any person.</i></li> <li><i>b) An accident to the rail vehicle itself.</i></li> <li><i>c) An accident to any other rail vehicle, equipment or plant</i></li> <li><i>d) <b>Damage likely to endanger the safety of:</b></i> <ul style="list-style-type: none"> <li><i>i) Any person or animal</i></li> <li><i>ii) Trains</i></li> <li><i>iii) The infrastructure</i></li> <li><i>iv) The environment.</i></li> </ul> </li> </ul> <b>It includes a deficiency in authorised documentation or systems that could, if implemented, cause a high risk defect as above.</b>
Austria	This legislation specifies the reporting of various accident and <b>incident</b> occurrence types.

### 3.2.3 Proposed Amendments to the Existing Reporting Arrangements

In simple terms the bottom up analysis indicates that those Member States collecting the volume of occurrences anticipated are collecting occurrences against the same accident categories as the CSIs (collision, derailment, level crossing accidents, accidents to persons caused by rolling stock in motion, fires and others). However, they collect not just serious accidents, but also incidents involving minor harm or incidents that might have resulted in an accident under different circumstances.

This suggests a simple amendment to the existing reporting of the CSIs to extend their scope from significant accidents to all accidents with an accident being defined as any event resulting in harm to a passenger, employee or other person involving rolling stock in motion, any event resulting in 2 or more hours suspension of train services and damage to the infrastructure, rolling stock or environment of Euro 150,000 or more. The existing definitions of the CSIs being reported would remain as they currently are.

Further extension of this to incidents involving rolling stock in motion and which under other circumstances may have resulted in significant accidents should be considered i.e. near misses and



precursor events. These types of incident are often referred to as Potentially High Risk Train Accidents and can be captured against the same categories as the CSIs.

- Train Collision with rail vehicle
- Train collision with object within the clearance gauge
- Train Derailment
- Level Crossing Accident
- Accident to Person Involving Rolling Stock in Motion (including unauthorised persons)
- Fire- loss of containment of flammable material,
- Explosion – loss of containment of explosive material
- Near miss intentional self-harm
- Other incident involving rolling stock in motion that in other circumstances would have led to a significant accident or harm

### 3.2.4 Top Down Approach - Objective Setting

In section 2.1 of this report the significance of setting an objective for an occurrence reporting system was discussed. Currently no clear objective is defined for a European level common occurrence reporting regime, which identifies an added value relative to comprehensive National Occurrence Reporting regimes alone. In order to achieve the development of an example taxonomy for this project DNV GL has developed an objective based upon its own analysis of needs and its experience with reporting systems. It should be noted that alternative objectives may be developed and agreed with stakeholders in the future, which would require alternate taxonomies to support them.

At an EU level the collection of occurrences related to Potentially High Risk Train Accidents does provide such a suitable objective. High Risk Train accidents are thankfully rare events at a national level and in any given year. It is quite possible that a Member State will not experience any in a given year. They remain however a source of concern for the travelling public and other important stakeholders. It is therefore important for rail actors in the sector and the National Safety Authority to maintain an understanding of the level of risk to safe railway operations that these events present. For rare events like High Risk Train Accidents it can be beneficial to look at the risk at an EU rather than national level as it is only at an EU level that there are sufficient incidents to understand the underlying risk. A suitable objective for an EU level common occurrence reporting regime would therefore be to better understand the risk of Potentially High Risk Train accidents.

This objective is closely aligned to the existing objectives implicit in the CSI reporting structure. This defines a significant accident as being “an accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track or other installations or environment, or extensive disruptions to traffic, excluding accidents in workshops, warehouses and depots”. By adopting this objective a number of the occurrences described in section 3.2.2 (i.e. from the bottom up approach) can be placed out of scope:

- Security related occurrences such as sabotage or bomb threats or assault
- Passenger accidents at platforms or within station areas
- Slips, trips and falls of passengers, employees, members of the public, and unauthorised persons
- Occupational health issues for employees

- Track defects requiring speed restrictions or closure
- Failures of the power supply or traction system
- Shunting unless it takes place on the mainline railway.

Hence these have not been carried forward to the subsequent taxonomy proposal. The other occurrence types in Section 3.2.2 have been carried through.

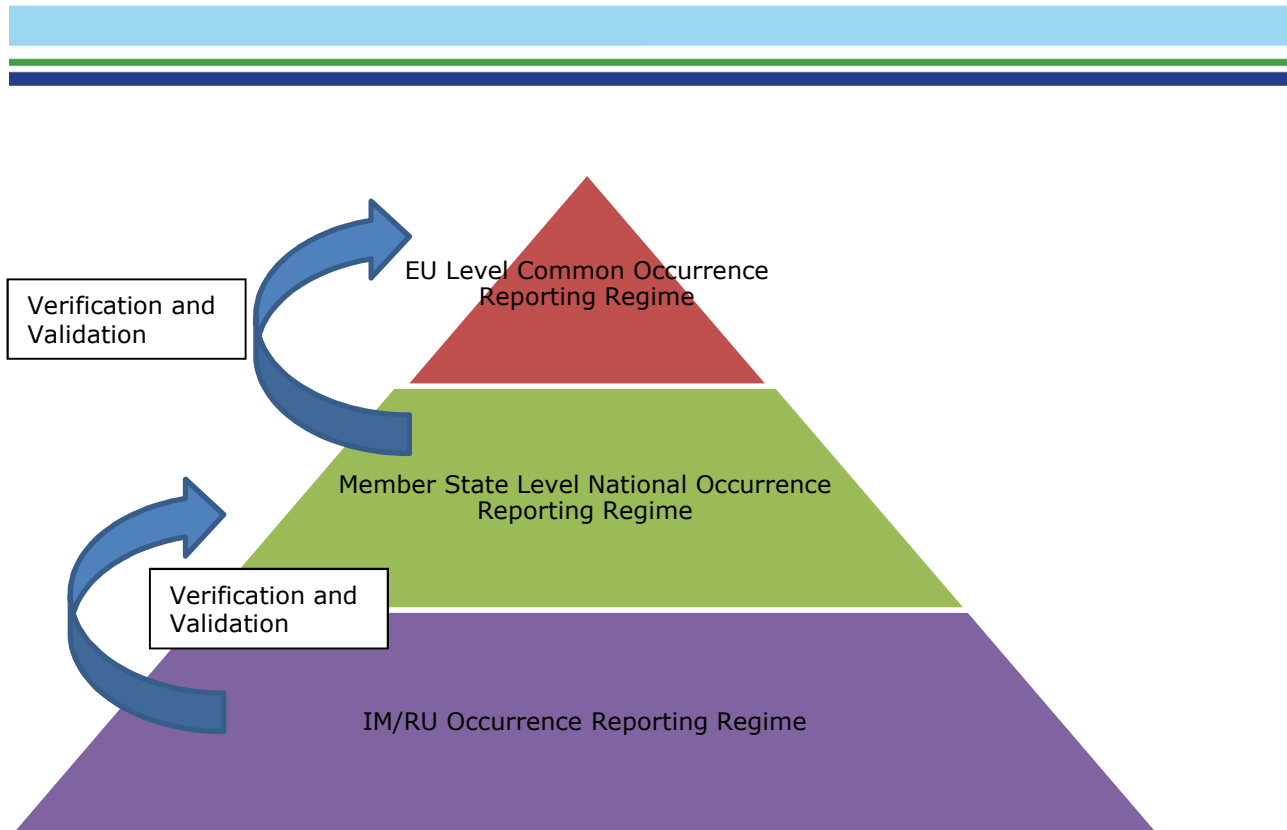
### 3.2.5 Summary for Comprehensive National Occurrence Reporting Regimes

In summary the first element of the proposed common occurrence system is to extend the scope of reporting at Member State level by a simple amendment to the definition of a significant accident such that it covers all accidents resulting in harm against the existing CSI reporting categories. This may be further extended into the collection of incident data on Potentially High Risk Train Accidents which under different circumstances could have resulted in harm against the CSI reporting categories. Understanding better the risk represented by Potentially High Risk Train Accidents would also represent an appropriate objective for a European level common occurrence reporting regime.

## 3.3 EU Level Common Occurrence Reporting – Consolidated or Metadata

The impact analysis on task 3 demonstrated a positive benefit for the adoption of a comprehensive occurrence reporting regime at Member State level collecting of the order of 300,000 occurrences per annum. The impact assessment was clear that no further net benefit was available at an EU level through the further recording of these into a separate or additional EU level occurrence reporting regime. Rather it was recommended that meta data be collected for which a net benefit over ten years was realisable.

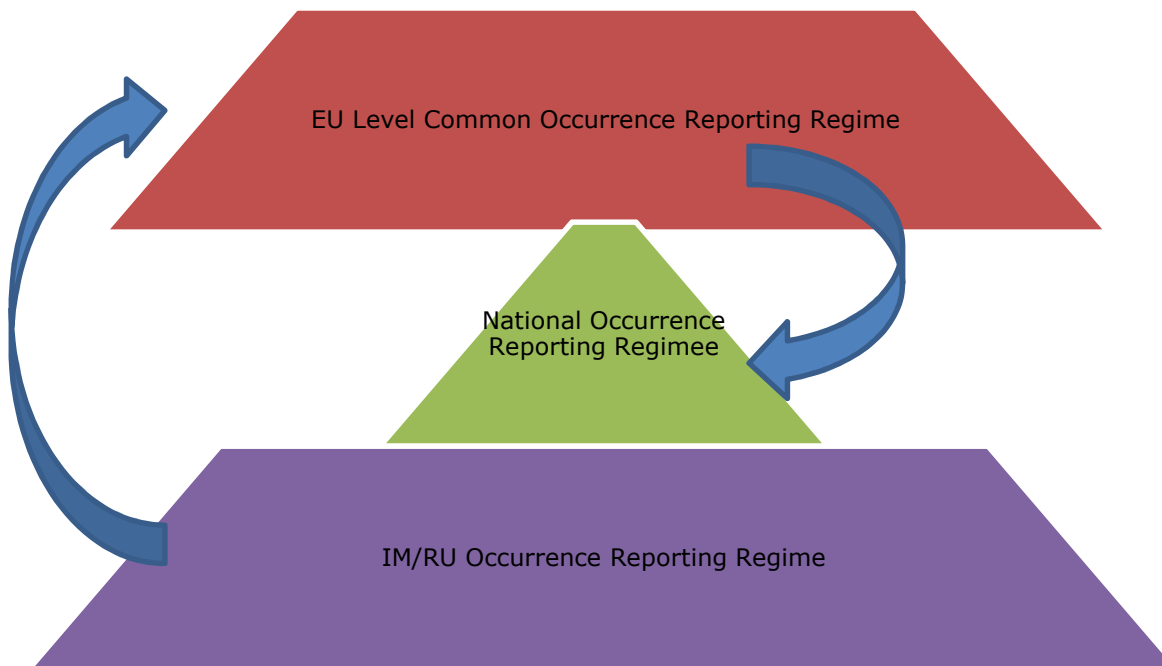
The impact analysis in task 3 considered the chain of reporting for an occurrence in conceptual terms as being (figure 2):



**Figure 2 – The Hierarchy of Reporting as an Occurrence Report Progresses Through the Various Occurrence Reporting Systems**

The IM/RU will require their own occurrence reporting system as they capture all accidents, incidents and near misses as an integral part of the management of their safe operation. These incidents are then reported to the Member State and where appropriate recorded in the national occurrence reporting system. This may be considered a duplication and certainly the task 1 report found that some member States NSAs utilise the incumbent IM's occurrence reporting system rather than creating their own duplicate one. This system works well for instances in which there is one IM and one RU, but for Member States having multiple IMs or RUs this system would be difficult to manage as an NSA would have to consult multiple databases to gain an overview of railway safety within their borders. For this reason a majority of NSAs maintain their own national occurrence reporting system.

At an EU level the impact analysis indicated that it was not cost beneficial to have the IM/RU make an occurrence report to both the National and the Common Occurrence Reporting system. The duplication of cost involved and the need for a single body at an EU level to process 300,000 occurrences per annum makes this disadvantageous. It would in principle be possible to envisage a regime in which the occurrence report went direct to the common occurrence reporting system at the EU level and that the NSA could then access a subset of this as the national occurrence reporting system (figure 3). This would have a similar positive cost benefit to the approach shown in figure 2. However, in any occurrence reporting system data validation and verification are important components of the reporting regime, both of which have been modelled in the cost benefit analysis. Without valid and verifiable data any decision made using the common occurrence reporting database may be in error and it would not be suitable for either safety related or safety critical decisions, both of which would be expected from a common occurrence reporting system. Both verification and validation are best and most easily undertaken as close to the source of the occurrence as possible, both in geographical and cultural terms. For this reason an EU level common occurrence reporting regime which the NSAs can partially access as a national occurrence reporting regimes is not recommended and has not been pursued.



**Figure 3 – A Visual Representation of an EU Level Common Occurrence Reporting regime being Fed Directly with Occurrence Data form the IM/RU Occurrence Database and then Using a Subset of this Data to Report to the NSA as a National Occurrence Reporting Regime**

The appropriate means of reporting is as shown in figure 2 from the local level to the national and then EU level with validation and verification at each stage. The option that is cost beneficial in terms of EU common occurrence reporting utilises meta data i.e. consolidated data. The impact assessment considered that the meta data would constitute approximately 29,000 reports per annum, or approximately 10% of the volume of data found in the Member State National Occurrence Reporting Regimes<sup>5</sup>.

This volume of reporting could be achieved in two ways:

- i. Only the 29,000 most significant accidents or incidents could be reported.
- ii. All 300,000 occurrences are reported but only at a level of detail that is 10% of that in a comprehensive National Occurrence Reporting system.

The first option is not recommended as it would achieve only a breadth of reporting that is ten times that available today in the ERAIL database as shown by the number of significant accidents recorded per year in ERAIL (table 6).

**Table 6 – The number of Significant Accidents Recorded in the ERAIL Database by Year.**

Year	Number of Significant Accidents
2006	4832
2007	3823
2008	3738

<sup>5</sup> Sensitivity analysis on the impact assessment indicates that a positive cost benefit is still achieved over a ten year period with up to 80,000 occurrence reports being processed each year at an EU level in a mandatory reporting regime and 40,000 in the voluntary scenario.

Year	Number of Significant Accidents
2009	2830
2010	2384
2011	2329
2012	2149
2013	2074

Whilst this would provide a greater level of detail on each of these significant accidents and for accidents involving major injuries it would not provide any visibility of less serious accidents, incidents or near misses which table 5 demonstrated was the area that comprehensive National Occurrence Reporting regimes extended into. Thus, for option (i) limited benefit could be expected.

Option (ii) provides for the Member States to report into the Common Occurrence Reporting regime a limited volume of data on each significant occurrence and consolidated data on the less severe incidents and precursors if that is considered appropriate. In effect this limited volume of data would provide basic details of the accident, its consequences and causes and a means for an interested party to obtain further information, either from a direct link to an accident investigation report or a link to a knowledgeable contact within the relevant Member State. This provides visibility of the number and consequence of accidents at an EU level without duplicating the work of the Member States in investigating, validating and verifying the data. The consolidated data on incidents and precursors would be to a similar taxonomy to that of the individual significant occurrences but consolidated (e.g. annual numbers of derailments, collisions and fires in a set time period).

This system has a further advantage in that no confidential or sensitive information would be held in the EU level common occurrence reporting system. This would support the existence of the database for the Common Occurrence Reporting regime as a public one, if this is a direction in which the Agency and stakeholders and users wish to go.

## 3.4 Taxonomy

### 3.4.1 National Occurrence Reporting Regime

This section establishes the minimum reporting requirements at the national level. Individual Member States may choose to go beyond these requirements for their own purposes should they wish to. The definition of an accident reportable to the relevant National Occurrence Reporting system is:

*"Any accident involving at least one rail vehicle in motion, resulting in harm to at least one person or in significant damage to rolling stock, track, other installations or environment, or significant disruption to traffic. Accidents in workshops, warehouses and depots are excluded.*

*Significant damage is damage equivalent to €150,000 or more.*

*Significant disruption to traffic is the suspension of train services on the line for 2 or more hours in either direction."*

These accidents should be divided into the categories of:

- Collision of train with rail vehicle
- Collision of train with obstacle

- Derailment
- Level crossing accident
- Accident to persons involving rolling stock in motion
- Fire in rolling stock
- Explosion in rolling stock
- Other accident
- Accident involving the transport of dangerous goods
- Intentional self-harm

These are defined in Appendix 1.

It is recommended that each Member State be allowed to specify its own taxonomy and comprehensive reporting regime provided it can capture at a minimum the detail required for the EU level common Occurrence Reporting regime below.

### 3.4.2 Common Occurrence Reporting Regime

The limited taxonomy of these occurrences that is recommended for inclusion in the EU level Common Occurrence Reporting regime is shown in Appendix 2. This is based on the combined bottom up consideration of the Member States in 3.2.2, the existing CSIs and ERAIL reporting and the top down objective in section 3.2.4. The attributes and values reported under this taxonomy has been derived from a consideration of what is commonly reported by all 29 Member States (taxonomy analysis under task 1) and what DNV GL considered would give value in regard to the objective of better understanding Potentially High Risk Train Accident risk at an EU level.

In addition to this, consolidated data can be reported on a periodic basis (monthly, quarterly, annually as agreed by users) against the defined categories in 3.4.1 for which no harm resulted, but which had the potential to result in harm to any person on the railway had the incident happened under different circumstances. This should extend to near misses for intentional self-harm occurrences.

This consolidated data should be reported against the same taxonomy as the National Occurrence Reporting regime but not at the level of an individual occurrence but as a count of the number of occurrences in those categories.

A near miss for intentional self-harm is defined as:


**“Near miss for intentional self-harm”** means an individual on or approaching a railway with the intention of committing an act as deliberate self-harm, but who is prevented or dissuaded from committing the act.

It should be noted that the definition of a reportable occurrence is against the level of harm resulting. This is classified either as a fatality, major injury or minor injury. The definitions of these are below:

**“Fatality”** means a level of harm arising from an occurrence that results in a death within one month of the occurrence directly as a consequence of the occurrence

**“Major injury”** means a level of harm arising from an occurrence that results in

- fractures, other than to fingers, thumbs and toes
- amputations

- 
- any injury likely to lead to permanent loss of sight or reduction in sight
  - any crush injury to the head or torso causing damage to the brain or internal organs
  - serious burns (including scalding) which:
    - covers more than 10% of the body
    - causes significant damage to the eyes, respiratory system or other vital organs
  - any scalping requiring hospital treatment
  - any loss of consciousness caused by head injury or asphyxia

**“Minor injury”** means all other levels of harm to an individual as a consequence of an accident.



## 4 PROPOSED IMPLEMENTATION

### 4.1 Preconditions for Success

The Task 1 report "Assessment of Existing National Occurrence reporting Regimes and Systems" describes the preconditions for the establishment of a successful Common Occurrence Reporting regime. These are:

- **Establish an Objective** – A clear and agreed objective must exist for any occurrence reporting regime to have benefit. Without an objective there is a risk of this data being collected for no benefit and very quickly any occurrence reporting regime will fall out of use.
- **Establish an Appropriate Regulatory Framework** – The impact assessment recommends a mandatory approach to achieving both comprehensive National Occurrence Reporting regimes and an EU level Common Occurrence Reporting Regime. A supporting legislative framework will be necessary to achieve this as a mandatory option. It should be noted that the mandatory option should establish a minimum for reporting and not restrict those who wish to report a greater scope or extent of occurrences for their own purposes. Legislation should be enabling in this regard and not unnecessarily prescriptive beyond the common requirements in the Common Occurrence Reporting regime.
- **Gain User Support** – Those who will input data or receive reports from the occurrence reporting system should have a means of providing input to the future design and operation of the system so that they understand and support the use of the reporting system.
- **Ensure Ease of Use** – The easier the reporting system is to use the greater will be the use of the system. Standard forms and templates based on a limited set of simple criteria encourage reporting. Attempts to create all-encompassing reporting systems often face user resistance as they are time consuming or difficult to use.
- **Apply Validation and Verification of Data** – The data should be validated and verified as appropriate to the agreed objective. Safety critical decisions should only be made on comprehensive and accurate data. As noted in section 3 it is proposed that this is best achieved as close to the incident as possible i.e. at Member State level.

Failure to achieve any of these preconditions can be expected to result in limited benefit from the Common Occurrence Reporting system.

Based upon the discussion of the top down and bottom up approaches described in the task 1 report and the above list of preconditions the following steps are recommended as a means of implementing both comprehensive national and common EU reporting systems.

### 4.2 Modification to Directive 2009/149/EC

It is recommended the definition of an accident that must be reported be extended from significant to any that causes harm. Consider the further extension to the collections of incidents (near misses) and precursors associated with Potentially High Risk Train Accidents. Establish any additional reporting requirements as identified by the gap analysis described in section 4.4. This links to the precondition on establishing an appropriate regulatory framework.

### **4.3 Production of Guidance**

It is recognised that it is not a trivial exercise to modify a Directive. As an interim measure the Agency should consider amending its implementation guidance on CSIs pointing out the benefits to be had from a Member State adopting a comprehensive national reporting regime as a voluntary measure, noting that many Member States have already chosen to do this.

Further guidance to the Member States on the development of occurrence reporting should also be considered, so that individual National Occurrence Reporting regimes, whilst being permitted to vary in scope and extent, establish the core reporting requirements. This guidance should stress the very considerable benefits to be realised from a comprehensive National Occurrence Reporting Regime.

### **4.4 Convene a User Group under the Chairmanship of the Sector**

The purpose of the User Group would be to provide governance to the common occurrence reporting system and in particular to establish the objective for the system and the associated taxonomy. As an interim measure an objective of better understanding train accident risk at an EU level should be set to allow an interim taxonomy to be developed.

This taxonomy can be informed by both the top down objective and the bottom up commonality of what is reported currently. A gap analysis between the two may inform the modifications to Directive 2009/149/EC as described in section 4.2.

This links to the precondition of gaining user support.

### **4.5 Establish a Common Reporting Form**

To support a consistent method of common occurrence reporting the User Group should agree as a priority a common reporting form or format that defines the occurrence data to be captured at the EU level. Member States may add to the requirements within their boundaries but not alter the core reporting requirements. This relates to the precondition for ensuring ease of use.

### **4.6 The Creation of an EU Level Database**

The Agency should extend the existing ERADIS and ERAIL databases to reflect the taxonomy and reporting format agreed by the User Group.


### **4.7 Ongoing Management**

The User Group should monitor the Common Occurrence Reporting system against the objectives it has set itself and propose amendments as appropriate and ensure quality of the database. This links to the precondition on the validation and verification of data.

It should be recognised that the EU level Common Occurrence Reporting system will evolve with time. Supplementary reporting requirements and development of the taxonomy would be generated if additional objectives for the system are set. As an example if the reporting regime and database are to be used to support a risk model in future then additional occurrence concerning incidents (near misses) and precursors may be required. Consequently the scope and extent of reporting and the taxonomy may have to adapt. The User Group would help to guide this evolution.

### **4.8 Establish a Historical Record**

Data from existing Member State National Occurrence Reporting regimes which are currently comprehensive or intermediate can be imported into the EU level Common Occurrence Reporting system



to establish a searchable historical record, albeit one which will likely be incomplete in some aspects. This will be beneficial for those undertaking analysis and research into safety and risk management relating to Potentially High Risk Train Accidents within the EU.

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## 5 CONCLUSIONS

Building on the work presented in the task 1 and 3 reports this task 4 report discusses the commonality of reporting found at a national level across the EU, Norway, Switzerland and Channel Tunnel which could form the basis of a common occurrence reporting regime. It further discusses a suitable objective for such a regime that would be appropriate at an EU level and finally describes an initial taxonomy for such a regime.

The central proposal is that all Member States' National Occurrence Reporting regimes are brought up to a minimum standard matching the definition of a comprehensive occurrence reporting system. These National Occurrence Reporting systems, respecting the principle of subsidiarity, may be of varying scope but should include the ability to record a core set of information relating to the accident categories characterised as Potentially High Risk Train Accidents. These are as defined in the existing Common Safety Indicator (CSIs) Guidance<sup>6</sup> and should be recorded for significant accidents and for all other accidents resulting in harm (major injuries and minor injuries). Benefit will also derive from reports of near miss incidents that cause no harm and it is recommended that these too are recorded in the same occurrence reporting system.

A subset of the information on Potentially High Risk Train Accidents should be provided in a common format to an EU level Common Occurrence Reporting regime as meta data.

A recommended implementation plan is presented together with an initial taxonomy for the Common Occurrence Reporting regime at the EU level.

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<sup>6</sup> Implementation Guidance for Common Safety Indicators Annex 1 to the Directive 2004/49/EC as Amended by Directive 288/2014/EC, ERA-GUI-02-2015

## APPENDIX ONE - DEFINITIONS

### Accident Categories

“**collision of train with rail vehicle**” means a front to front, front to end or a side collision between a part of a train and a part of another train or rail vehicle, or with shunting rolling stock;

“**collision of train with obstacle within the clearance gauge**” means a collision between a part of a train and objects fixed or temporarily present on or near the track (except at level crossings if lost by a crossing vehicle or user), including collision with overhead contact lines;

“**derailment of train**” means any case in which at least one wheel of a train leaves the rails;

“**level crossing accident**” means any accident at level crossings involving at least one railway vehicle and one or more crossing vehicles, other crossing users such as pedestrians or other objects temporarily present on or near the track if lost by a crossing vehicle or user;

“**accident to persons involving rolling stock in motion**” means accidents to one or more persons who are either hit by a railway vehicle or by an object attached to, or that has become detached from, the vehicle, this includes persons who fall from railway vehicles as well as persons who fall or are hit by loose objects when travelling on board vehicles;

“**fire in rolling stock**” means a fire that occurs in a railway vehicle (including its load) when it is running between the departure station and the destination, including when stopped at the departure station, the destination or intermediate stops, as well as during re-marshalling operations;

“**explosion in rolling stock**” means an explosion that occurs in a railway vehicle (including its load) when it is running between the departure station and the destination, including when stopped at the departure station, the destination or intermediate stops, as well as during re-marshalling operations;

“**other (accident)**” means any accident other than a collision of train with rail vehicle, collision of train with obstacle within the clearance gauge, derailment of train, level crossing accident, an accident to person involving rolling stock in motion or a fire in rolling stock;

“**accident involving the transport of dangerous goods**” means any accident or incident that is subject to reporting in accordance with RID (1)/ADR section 1.8.5.

‘**intentional self-harm**’ means an act to deliberately injure oneself resulting in harm, as recorded and classified by the competent national authority.<sup>7</sup> “**near miss for intentional self-harm**” means an individual on or approaching a railway with the intention of committing an act as deliberate self-harm, but who is prevented or dissuaded from committing the act.

### Other Attributes Referred to in Taxonomy in Appendix Two (arranged alphabetically)

**Broken rail** – any rail that is separated into two or more pieces. Or any rail from which a piece of metal becomes detached leaving a gap of no less than 50mm in length and no less than 10mm in depth on the running surface.

**Cutting** – an area of railway infrastructure in which soil or rock has been removed often from a hillside to make way for the railway.

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<sup>7</sup> This is included as an accident as whilst it may be considered as an intended event rather than unintended, it is unwanted by the railway and other wider stakeholders including society. It then fulfils the basic definition of an accident as an “unwanted or unintended sudden event”.

**Dangerous goods released** – any accident or incident that is subject to reporting in accordance with RID(1)/ADR 1.8.5d

**Diesel Multiple Unit** - one or more railcars forming a train powered by an internal combustion engine.

**Disruption** – the period of time in minutes for which train services on a railway line are delayed or suspended.

**Electric Multiple Unit** – one or more railcars forming a train powered by electric traction.

**Embankment** – a raised bank to carry a railway often over a low lying area.

**Employee** – a human being who is either employed directly or as a contractor to the railway company and who is present on the railway infrastructure for the purpose of their work.

**Engineering train** - one or more railway vehicles hauled by one or more locomotives or railcars, or one railcar travelling alone, running under a given number or specific designation from an initial fixed point to a terminal fixed point, including a light engine, i.e. a locomotive travelling on its own predominantly for the purposes of railway infrastructure management.

**Environmental damage** – the cost in Euros required to return the area adjacent to or affected by the railway accident to its previous condition. This includes damage to the area above and below the accident site and underground areas.

**Fatality** - a level of harm arising from an occurrence that results in a death within one month of the occurrence directly as a consequence of the occurrence

**Freight train** - one or more railway vehicles hauled by one or more locomotives or railcars, or one railcar travelling alone, running under a given number or specific designation from an initial fixed point to a terminal fixed point, including a light engine, i.e. a locomotive travelling on its own predominantly carrying goods under contract.

**High speed train service** – a passenger or freight train that operates between two population centres on dedicated high speed infrastructure as defined by the Member State.

**Infrastructure damage** – damage to the track, electrification, signalling system, civil structures or other fixed installations within the railway boundary quantified in Euros.

**Infrastructure operational failure** – an error by a member of the infrastructure manager’s staff associated with the irregular application of the rule book.

**Level Crossing** – a railway, road, cycle way, bridle path, or footpath that crosses the railway on the level.

**Line speed (kilometres per hour)** – the maximum speed as set by the infrastructure manager at which trains may normally operate over a line.

**Locomotive Hauled** – a train consisting of unpowered carriages drawn by a locomotive.

**Major injury** - means a level of harm arising from an occurrence that results in:

- fractures, other than to fingers, thumbs and toes
- amputations
- any injury likely to lead to permanent loss of sight or reduction in sight
- any crush injury to the head or torso causing damage to the brain or internal organs

- serious burns (including scalding) which:
  - covers more than 10% of the body
  - causes significant damage to the eyes, respiratory system or other vital organs
- any scalping requiring hospital treatment
- any loss of consciousness caused by head injury or asphyxia

**Minor injury** - all other levels of harm to an individual as a consequence of an accident.

**Narrative** - a text field in the taxonomy into which the user may enter data without restriction.

**Number of running lines present** - the number of individual railway lines present in a rail corridor.

**Passenger** - a human being, not an employee of a railway company, who is present on the railway infrastructure for the purposes of a railway journey under contract.

**Passenger Train** - one or more railway vehicles hauled by one or more locomotives or railcars, or one railcar travelling alone, running under a given number or specific designation from an initial fixed point to a terminal fixed point, including a light engine, i.e. a locomotive travelling on its own predominantly carrying people under contract.

**Plain line** - railway infrastructure consisting of track without significant features such as switches and crossings.

**Protected level crossing** - a level crossing in which the signalling system provides warning or protection to users of an approaching train.

**Regional Train Service** - a passenger or freight train service that typically operates between two population centres, but not on dedicated high speed infrastructure.

**Rolling stock damage** - damage to railway vehicles quantified in Euros.

**Signal or train protection failure** - any failure of a signalling system (either to rolling stock or infrastructure systems) that results in a less restrictive aspect than that demanded.

**Station** - a place at which passengers may legitimately alight and board a passenger train.

**Switch and Crossing** - a mechanical installation that allows trains to be guided from one track to another.

**Third party Member of Public** - a human being with a legitimate reason for being present on the railway infrastructure, but who is not a passenger or employee.

**Third party Unauthorised User** - a human being with no legitimate reason for being present on the railway infrastructure, and who is not a passenger or employee.

**Tunnel collapse** - any structural instability in a tunnel that affects the safe running of trains on or adjacent to it.

**Urban Train Service** - a passenger or freight train that typically operates in a built environment characterised by a high frequency service often at relatively low line speed.

## APPENDIX TWO – PROPOSED TAXONOMY

### What happened (nature of occurrence)?

#### i. Type of accident:

- a. Collision of train with rail vehicle
  - i. Nature of Collision
    - 1. Passenger Train
    - 2. Freight Train
    - 3. Engineering Train
- b. Collision of train with obstacle
  - i. Nature of obstacle
    - 1. Road vehicle at level Crossing
    - 2. Animal
    - 3. Railway Infrastructure
    - 4. Other
- c. Derailment
- d. Level crossing accident
- e. Accident to persons involving rolling stock in motion (including unauthorised person)
- f. Fire in rolling stock
- g. Explosion in rolling stock
- h. Other accident
  - i. Narrative – describe in free text
- i. Accident involving the transport of dangerous goods
- j. Intentional self-harm

#### ii. Type of harm

- a. Fatality (number)
  - i. Fatality to:
    - 1. Passenger
    - 2. Employee
    - 3. Third party Member of Public





4. Third party Unauthorised User

b. Major injury (number)

i. Injury to:

1. Injury to Passenger
2. Employee
3. Third party Member of Public
4. Third party Unauthorised User

c. Minor injury (number)

i. Injury to:

1. Injury to Passenger
2. Employee
3. Third party Member of Public
4. Third party Unauthorised User

d. Disruption

i. How long (minutes)

e. Infrastructure damage

i. How much (Euro)

f. Rolling stock damage

i. How much (Euro)

g. Environmental damage

i. How much (Euro)

h. Dangerous goods released

i. Narrative (describe release)

i. Incidents which under slightly different circumstances would have resulted in a significant accident

**iii. Type of train involved**

a. Passenger

i. Type of passenger train

1. Electric Multiple Unit
2. Diesel Multiple Unit
3. Locomotive hauled#

ii. Type of service

- 1. High speed
- 2. Regional
- 3. Urban
- b. Freight
- c. Engineering train

## Where did the Occurrence happen?

### i. Country

- a. List of Member States

### ii. Line


- a. Infrastructure Feature that Occurrence Happened over
  - i. Number of running lines present (number)
    - 1. Other features
      - a. Embankment
      - b. Cutting
      - c. Switch and Crossing
      - d. Plain line
      - e. Level Crossing
        - i. Protected (Yes/No)
        - ii. Pedestrian or road
      - f. Station
    - ii. Line speed (kilometres per hour)

## Why did the Occurrence happen?

### i. Direct cause of the accident and link to relevant standards

#### a. Infrastructure failure

- i. Nature of failure
  - 1. Broken rail
    - a. Link to INF TSI
  - 2. Switch and Crossing
    - a. Link to INF TSI

- 
3. Level Crossing
    - a. Narrative – describe relevant standard in free text
  4. Embankment collapse
    - a. Narrative – describe relevant standard in free text
  5. Tunnel collapse
    - a. Link to SRT TSI
  6. Signal or train protection failure
    - a. Link to CoCoSig TSI
  7. Infrastructure operational failure
    - a. Narrative – describe relevant standard in free text
  8. Other
    - a. Narrative – describe in free text
      - i. Narrative – describe relevant standard in free text

**b. Rolling stock failure**

- i. Nature of failure
  1. Broken wheel
    - a. Link to RST or WAG TSI
  2. Broken Axle
    - a. Link to RST or WAG TSI
  3. Suspension failure
    - a. Link to RST or WAG TSI
  4. Door interlocking
    - a. Link to RST TSI
  5. Rolling stock operational
    - a. Link to OPS TSI
  6. Rolling stock train protection failure
    - a. Link to CoCoSig
  7. Brake failure
    - a. Link to RST or WAG TSI
  8. Fire
    - a. Narrative – describe relevant standard in free text
  9. Explosion

- a. Narrative – describe relevant standard in free text

10. Other

- a. Narrative – describe relevant standard in free text

**c. Operational failure**

i. Nature of failure

1. SPAD

- a. Link to CoCoSig TSI

2. Platform overrun

- a. Link to Ops TSI

3. Overspeeding

- a. Link to Ops TSI

4. Train run away

- a. Link to Ops TSI

5. Other

- a. Narrative – describe relevant standard in free text

**d. Adverse environmental conditions**

i. Low adhesion

ii. Flooding

iii. Object blown on line

iv. Animal or other on line

v. Other Narrative

**e. Intentional Self-Harm**

**f. Person not authorised to be on railway infrastructure**

## **When did the Occurrence Happen?**

**i. Date**

**ii. Time**

## **Parties involved?**

**i. Infrastructure Manager (name)**

**ii. Railway Undertaking (name)**

**iii. National Safety Authority (name)**

**iv. Unique reference number**



**v. Contact for full details of occurrence**

**vi. Link to NIB report (if relevant)**



## PROPOSED TAXONOMY

What				Where				Why				When	Who			
Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4	Level 1	Level 1			
Type of accident	Collision with train			Country				Cause of accident	Infrastructure failure			Standard Involved	Date	IM		
		Passenger train		Line Infrastructure feature						Broken rail	INF TSI				Time	RU
		Freight train			Number of lines					Switch and crossing	INF TSI					NSA
	Collision with object	Engineering train					Embankment				Level crossing Embankment collapse	Narrative		Unique reference number Contact for full occurrence report		
		Road Vehicle at Level crossing	Narrative				Cutting Switch and Crossing				Object on line	Narrative				
		Road Vehicle other Animal	Narrative				Level Crossing Protection				Tunnel collapse Signal failure	SRT TSI COCOSIG TSI				
		Infrastructure	Narrative				Protected (yes/no) Pedestrian or road				Infrastructure operational failure	OPS TIS				
	Type of Harm	Derailment Level crossing accident Accident to persons involving rolling stock in motion Fire Explosion Other	Other	Narrative						Rolling stock failure						
						Plain Line Station						Other (specify)	Narrative			
						Line speed						Broken wheel	RST TSI			
Accident involving dangerous goods											Broken axle	WAG TSI RST TSI				
											Suspension failure	WAG TSI RST TSI				
Type of Train		Intentional Self Harm														
			Fatality	Type of person harmed												
						Passenger Employee Third Party - Member of Public Third Party - Unauthorised User										
		Major injury	Type of person harmed													
					Passenger Employee Third Party - Member of Public Third Party - Unauthorised User											
	Minor injury	Type of person harmed														
				Passenger												
	Disruption															
Type of Train	Passenger															
	Freight															
	Engineering															









## **About DNV GL**

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter and greener.