Economic Commission for Europe

Inland Transport Committee

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Committee of Experts and the Working Party on the Transport of Dangerous Goods
Bern, 12-16 March 2018
Item 7 of the provisional agenda
Accidents and risk management

1 March 2018

Contributions for reflecting on an improved reporting system of Inland TDG occurrences

Transmitted by the European Union Agency for Railways (ERA)

General information

As reported in the minutes of the Joint Meeting autumn session 2017, ERA was reminded that the TDG roadmap workshops should contribute to the topic of revising the content of the model reports on accidents/incidents.

In order to contribute to this reflection ERA presents with this document several contributions in relation with the potential improvement of TDG occurrence reporting.

ERA believes that these contributions should be considered by the Joint Meeting and would be interested to collect the views of the delegates on the potential further actions in this domain.

Contribution 1

As presented during the autumn session 2017, the Guide for risk estimations of the Inland TDG risk management framework will establish a harmonised risk estimation method applicable to the three inland transport modes.

In order to provide an overview of the main parameters used by the risk estimation method, a draft list of parameters is reported in appendix 1.

ERA believes that future reporting systems should ease the implementation of the harmonised risk estimation method in providing accessible and relevant statistics for the most important parameters.

Contribution 2

Another important contribution is concerning ERA proposal for the development of a (railway) Common Occurrence Reporting (COR) system which will cover TDG occurrences as part of the reporting of railway system occurrences.

ERA proposal for the development of the COR system is reported in appendix 2.

This proposal is in the consultation phase of the interested parties. Joint Meeting representatives are kindly invited to contribute to this consultation in reporting their comment at the following address: cor@era.europa.eu.

Contribution 3

The result of the TDG roadmap workgroup on data is provided in appendix 3.

It contains a working draft list of parameters which have been identified in existing reporting databases and considered relevant by the group for improving the level of information collected on Inland TDG occurrences.

From a general point of view the workgroup considered that this list of parameters may be used 1) for better learning on individual TDG events and 2) if the number of collected occurrences would provide representative samples, may allow for building better statistics.

Conclusion

The contributions presented in this document are linked at several levels and a good coordination is needed to develop one practicable and efficient answer for future reporting system(s) of Inland TDG occurrences, allowing better availability of key information also for risk management purpose.

The Agency would be interested to collect the views of the Joint Meeting concerning the following:

- Interactions between the COR proposal (appendix 2) and the reporting of TDG occurrences,
- Improvement needs of the existing reporting systems for TDG occurrences,
- The framework in which the Joint Meeting would wish interested experts continue with the development of well-coordinated reporting systems.

Appendix I

(DRAFT) LIST OF PARAMETERS USED IN THE HARMONISED RISK ESTIMATION MODEL

The following lists of parameters are currently applicable together with the other documents and tools composing the version 1.0 of the Framework on Inland TDG risk management.

The lists of parameters are categorised as following:

- General,
- Infrastructure and operations,
- Traffics,
- Transport events,
- DG releases,
- DG scenarios,
- Human vulnerabilities,
- Risk estimation,
- Decision-making.

For checking the validity of the information reported below the user of the present document is invited to upload the applicable version from this address www.inland-tdg.eu/tools/list of risk estimation parameters.

Appendix I

List of parameters allowing user-value setting

General parameters						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
MODE	Transport mode which is the object of risk estimation for a given segment of infrastructure		RL	RD	IWW	
GEO_SCOPE	Country / Region in/for which a case study is performed	Enum				
INF_CAT	Infrastructure category	-	**see section 4.1 of guide for risk estimations**			
OPE_CAT	Operation category	-	**see section 4.1 of guide for risk estimations**			

Appendix I

Infrastructure and operation parameters						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
AZI	Orientation towards the next segment in direction 1	degree	0°	0°	0°	n/a
CEMT	Conference Européenne des Ministres des Transports (acronym used for the navigability class of inland waterways)		**see section 4.1 of guide for risk estimations**			
END	End kilometric point	km				
FLU	Filling /Unfilling		**see section 4.1 of guide for risk estimations**			
GRID_TYPE / 1D	Mono-dimensional grid type					

Appendix I

GRID_TYPE / 1D+	Extended mono-dimensional grid type					
HLT	Handling / Loading / Transboarding		**see section 4.1 of guide for risk estimations**			
HRB	Harbor waters area (Inland waterways)		**see section 4.1 of guide for risk estimations**			
LENGTH	Length of a given segment	km				
MMP	Multimodal platform		**see section 4.1 of guide for risk estimations**			
MODE	Mode of transport	-	**see section 4.1 of guide for risk estimations**			
MYS	Marshalling yards		**see section 4.1 of guide for risk estimations**			

Appendix I

NET	Network		**see section 4.1 of guide for risk estimations**	
OLN	Open line		**see section 4.1 of guide for risk estimations**	
ORD	Open road		**see section 4.1 of guide for risk estimations**	
OWW	Open waterways		**see section 4.1 of guide for risk estimations**	
PRK	(car/truck) Park		**see section 4.1 of guide for risk estimations**	
RD	Roads		**see section 4.1 of guide for risk estimations**	

Appendix I

RL	Railways		**see section 4.1 of guide for risk estimations**			
SEG	Segment (portion of an infrastructure) where homogeneous properties of proposed parameters are described by the user of the framework to reflect at best a given risk situation					
SEG(N)	Segment number	(integer)				
SPEED_OPE_DIR1	Speed limit applicable to freight vehicles in direction 1	km/h	**see 'By default – Infrastructure parameters'**			
SPEED_OPE_DIR2	Speed limit applicable to freight vehicles in direction 2	km/h	**see 'By default – Infrastructure parameters'**			
START	Start kilometric point of a given segment	km				
STSD	Stations and sidings		**see section 4.1 of guide for risk estimations**			

Appendix I

TOT_LINES_N	Total number of lines/tracks/waterways lines	(integer)	**see 'By default – Infrastructure parameters'**	
TOT_LINES_N_DIR1	Number of lines in direction 1	(integer)	**see 'By default – Infrastructure parameters'**	
TOT_LINES_N_DIR2	Number of lines in direction 2	Nb	**see 'By default – Infrastructure parameters'**	
WIDTH_INF_DIR1	Width of the infrastructure premises counted from the centerline in direction 1	m	**see 'By default – Infrastructure parameters'**	
WIDTH_INF_DIR2	Width of the infrastructure premises counted from the centerline in direction 2	m	**see 'By default – Infrastructure parameters'**	
WTG	waters in Watergate area (Inland waterways)		**see section 4.1 of guide for risk estimations**	

Appendix I

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Appendix I

Traffic parameters						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
BKD_UN_NUM_YN	User setting of traffic breakdown per UN numbers					
BKD_CRGO_CC_YN	User setting of traffic breakdown per cargo capacity					
BKD_CONT_CC_YN	User setting of traffic breakdown per container capacity					
BKD_TOD_YN	User setting of traffic volume breakdown per time of the day					
CL	Class (of dangerous goods)					
CONT	Container					
CONT_CC_A_PRCT_DIR1	Ton percentage of traffic carried in large size containers in direction 1	%/ton				

Appendix I

CONT_CC_A_PRCT_DIR2	Ton percentage of traffic carried in large size containers in direction 2	%/ton				
CONT_CC_B_PRCT_DIR1	Ton percentage of traffic carried in medium size containers in direction 1	%/ton				
CONT_CC_B_PRCT_DIR2	Ton percentage of traffic carried in medium size containers in direction 2	%/ton				
CONT_CC_C_PRCT_DIR1	Ton percentage of traffic carried in small size containers in direction 1	%/ton				
CONT_CC_C_PRCT_DIR2	Ton percentage of traffic carried in small size containers in direction 2	%/ton				
CRGO	Cargo					
CRGO_CC_A_PRCT_DIR1	Ton percentage of traffic carried in large size cargoes in direction 1	%/ton				
CRGO_CC_A_PRCT_DIR2	Ton percentage of traffic carried in large size cargoes in direction 2	%/ton				
CRGO_CC_B_PRCT_DIR1	Ton percentage of traffic carried in medium size cargoes in direction 1	%/ton				

Appendix I

CRGO_CC_B_PRCT_DIR2	Ton percentage of traffic carried in medium size cargoes in direction 2	%/ton				
CRGO_CC_C_PRCT_DIR1	Ton percentage of traffic carried in small size cargoes in direction 1	%/ton				
CRGO_CC_C_PRCT_DIR2	Ton percentage of traffic carried in small size cargoes in direction 2	%/ton				
DGCL01_TY_PRCT	Ton percentage of DG traffic of Class 1	%ton				
DGCL21_TY_PRCT	Ton percentage of DG traffic of Class 2.1	%ton				
DGCL22_TY_PRCT	Ton percentage of DG traffic of Class 2.2	%ton				
DGCL23_TY_PRCT	Ton percentage of DG traffic of Class 2.3	%ton				
DGCL03_TY_PRCT	Ton percentage of DG traffic of Class 3	%ton				
DGCL41_TY_PRCT	Ton percentage of DG traffic of Class 4.1	%ton				
DGCL42_TY_PRCT	Ton percentage of DG traffic of Class 4.2	%ton				
DGCL43_TY_PRCT	Ton percentage of DG traffic of Class 4.3	%ton				

Appendix I

DGCL51_TY_PRCT	Ton percentage of DG traffic of Class 5.1	%ton				
DGCL52_TY_PRCT	Ton percentage of DG traffic of Class 5.2	%ton				
DGCL53_TY_PRCT	Ton percentage of DG traffic of Class 6.1	%ton				
DGCL61_TY_PRCT	Ton percentage of DG traffic of Class 6.2	%ton				
DGCL62_TY_PRCT	Ton percentage of DG traffic of Class 7	%ton				
DGCL08_TY_PRCT	Ton percentage of DG traffic of Class 8	%ton				
DGCL09_TY_PRCT	Ton percentage of DG traffic of Class 9	%ton				
DGFRT_NTKY	Dangerous goods freight traffic volume in number of ton.kilometer per year	ton.km/y				
DGCL01_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 1	%ton.km				
DGCL21_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 2.1	%ton.km				
DGCL22_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 2.2	%ton.km				
DGCL23_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 2.3	%ton.km				

Appendix I

DGCL03_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 3	%ton.km				
DGCL41_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 4.1	%ton.km				
DGCL42_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 4.2	%ton.km				
DGCL43_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 4.3	%ton.km				
DGCL51_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 5.1	%ton.km				
DGCL52_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 5.2	%ton.km				
DGCL53_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 6.1	%ton.km				
DGCL61_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 6.2	%ton.km				
DGCL62_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 7	%ton.km				
DGCL08_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 8	%ton.km				
DGCL09_TKY_PRCT	Ton kilometer percentage of DG traffic of Class 9	%ton.km				
FRT	Normal (non-DG) Freight Transport					

Appendix I

NFRT_TKY	Normal freight (non DG freight) traffic volume in ton.kilometer per year	ton.km/y				
NFRT_TUY	Normal freight (non DG freight) traffic volume in number of average transport unit movement per year	TU/y				
TOT_PASS_TRAF_NY	Total passenger traffic in per year	N/y				
TOT_FRT_TY	Total freight (non DG freight) traffic in a year	ton/y				
TOT_DGFRT_TY	Total DG freight traffic in a year	ton/y				
TRAF_UN_NUM_DIR1	UN number carried in direction 1	Num				
TRAF_UN_NUM_DIR2	UN number carried in direction 2	Num				
TRAF_UN_T_PRCT_DIR1	Ton percentage of the corresponding UN number traffic carried in direction 1	%ton				
TRAF_UN_T_PRCT_DIR2	Ton percentage of the corresponding UN number traffic carried in direction 2	%ton				
TRAF_DGFRT_T_PRCT_DIR1	Ton percentage of DG traffic carried in direction 1 per hour of the day	%ton				

Appendix I

TRAF_DGFRT_T_PRCT_DIR2	Ton percentage of DG traffic carried in direction 2 per hour of the day	%ton				
TRAF_FRT_T_PRCT_DIR1	Ton percentage of freight traffic carried in direction 1 per hour of the day	%ton				
TRAF_FRT_T_PRCT_DIR2	Ton percentage of freight traffic carried in direction 2 per hour of the day	%ton				
TRAF_PASS_N_PRCT_DIR1	Percentage of passenger traffic in direction 1 per hour of the day	%				
TRAF_PASS_N_PRCT_DIR2	Percentage of passenger traffic in direction 2 per hour of the day	%				
UN(N)	UN number allocated to a given share of dangerous good traffic volume	UN number	**see Table A of RID/ADR/ADN**			
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Appendix I

Transport events (see F1 tables)						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
IWW_OWW_DC1	Collision with ship	1/y				
IWW_OWW_DC2	(reserved)	1/y				
IWW_OWW_DC3	(reserved)	1/y				
IWW_OWW_DC4	(reserved)	1/y				
IWW_OWW_DC5	(reserved)	1/y				
IWW_OWW_DC6	Accidents to persons involving vessel in motion	1/y				
IWW_OWW_DC7	Collision with objects in water	1/y				
IWW_OWW_DC8	Collision with bridge or other infrastructures	1/y				

Appendix I

IWW_OWW_DC9	(reserved)	1/y				
IWW_OWW_DC10	(reserved)	1/y				
IWW_OWW_DC11	Overturning	1/y				
IWW_OWW_DC12	Stranding	1/y				
IWW_OWW_DC13	Fires (on vehicle part - not of cargo)	1/y				
IWW_OWW_DC14	Submerged/Flooded/Sunk vessel(s)	1/y				
IWW_OWW_DC15	(reserved)	1/y				
IWW_OWW_DC16	Package/Cargo drop	1/y				
IWW_OWW_DC17	Spontaneous loss of containment (Substance reaction, substance fire / Explosion, not due to transport occurrence)	1/y				
IWW_OWW_DC18	Package/Cargo hit	1/y				
IWW_OWW_DC19	(reserved)	1/y				
IWW_OWW_DC20	(reserved)	1/y				

Appendix I

IWW_OWW_DC21	Other	1/y				
RD_ORD_DC1	Collision - At least two vehicles - no turning	1/y				
RD_ORD_DC2	Collision - At least two vehicles - turning or crossing	1/y				
RD_ORD_DC3	Collision - Accidents with parked vehicles	1/y				
RD_ORD_DC4	Accidents between train and vehicle	1/y				
RD_ORD_DC5	(reserved)	1/y				
RD_ORD_DC6	Accidents with pedestrians	1/y				
RD_ORD_DC7	Collisions with objects or infrastructure (single vehicle)	1/y				
RD_ORD_DC8	(reserved)	1/y				
RD_ORD_DC9	(reserved)	1/y				
RD_ORD_DC10	(reserved)	1/y				
RD_ORD_DC11	Single vehicle accidents (other than collisions, including overturning)	1/y				

Appendix I

RD_ORD_DC12	Fires (of vehicle part - not of cargo)	1/y				
RD_ORD_DC13	Submerged/Flooded Road vehicle	1/y				
RD_ORD_DC14	(reserved)	1/y				
RD_ORD_DC15	(reserved)	1/y				
RD_ORD_DC16	Package/Cargo drop	1/y				
RD_ORD_DC17	Spontaneous loss of containment (Substance reaction, substance fire / Explosion, not due to transport occurrence)	1/y				
RD_ORD_DC18	Package/Cargo hit	1/y				
RD_ORD_DC19	(reserved)	1/y				
RD_ORD_DC20	(reserved)	1/y				
RD_ORD_DC21	Other	1/y				
RL_MYS_DC1	Front to front collisions	1/y				
RL_MYS_DC2	Front to end collisions	1/y				

Appendix I

RL_MYS_DC3	Side collisions	1/y				
RL_MYS_DC4	Level crossing accidents	1/y				
RL_MYS_DC5	(reserved)	1/y				
RL_MYS_DC6	Accidents to persons involving rolling stock in motion	1/y				
RL_MYS_DC7	Collisions with objects or infrastructure	1/y				
RL_MYS_DC8	(reserved)	1/y				
RL_MYS_DC9	(reserved)	1/y				
RL_MYS_DC10	(reserved)	1/y				
RL_MYS_DC11	Derailments	1/y				
RL_MYS_DC12	Technical failure on rolling stock	1/y				
RL_MYS_DC13	Fires (on vehicle part - not of cargo)	1/y				
RL_MYS_DC14	Submerged/Flooded railway vehicle(s)	1/y				

Appendix I

RL_MYS_DC15	(reserved)	1/y				
RL_MYS_DC16	Package/Cargo drops	1/y				
RL_MYS_DC17	Spontaneous losses of containment (Substance reaction, substance fire / Explosion, not due to transport occurrence)	1/y				
RL_MYS_DC18	Package/Cargo hit	1/y				
RL_MYS_DC19	(reserved)	1/y				
RL_MYS_DC20	(reserved)	1/y				
RL_MYS_DC21	Other	1/y				
RL_OLN_DC1	Collisions	1/y				
RL_OLN_DC2	(reserved)	1/y				
RL_OLN_DC3	(reserved)	1/y				
RL_OLN_DC4	Level crossing accidents	1/y				
RL_OLN_DC5	(reserved)	1/y				

Appendix I

RL_OLN_DC6	Accidents to persons involving rolling stock in motion	1/y				
RL_OLN_DC7	Collisions with objects or infrastructure	1/y				
RL_OLN_DC8	(reserved)	1/y				
RL_OLN_DC9	(reserved)	1/y				
RL_OLN_DC10	(reserved)	1/y				
RL_OLN_DC11	Derailments	1/y				
RL_OLN_DC12	Fires (on vehicle part - not of cargo)	1/y				
RL_OLN_DC13	Submerged/Flooded railway vehicle(s)	1/y				
RL_OLN_DC14	(reserved)	1/y				
RL_OLN_DC15	(reserved)	1/y				
RL_OLN_DC16	Package/Cargo drops	1/y				

Appendix I

RL_OLN_DC17	Spontaneous losses of containment (Substance reaction, substance fire / Explosion, not due to transport occurrence)	1/y				
RL_OLN_DC18	Package/Cargo hit	1/y				
RL_OLN_DC19	(reserved)	1/y				
RL_OLN_DC20	(reserved)	1/y				
RL_OLN_DC21	Other	1/y				

Appendix I

DG Releases (See also list of reference DG scenarios and pre-calculated tables)						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
DGR	Dangerous goods release		[Y/N]	[Y/N]	[Y/N]	
DGSC	Dangerous goods scenario		**See list of reference DG scenarios**			
P(RELEASE)=NO_RELEASE	Percentage of transport events where there is no release (see definition of release categories in section 7.3 of guide for risk estimation)	%	30	17 ; 32		OLN ; MYS
P(RELEASE)=SMALL_RELEASE	Percentage of transport events where there is a small release. (see definition of release categories in section 7.3 of guide for risk estimation)	%	30	70 ; 58		OLN ; MYS

Appendix I

P(RELEASE)=LIMITED_RELEASE	Percentage of transport events where there is a limited release. (see definition of release categories in section 7.3 of guide for risk estimation)	%	33	9 ; 8.5		OLN ; MYS
P(RELEASE)=CONTINUOUS_RELEASE	Percentage of transport events where there is a continuous release. (see definition of release categories in section 7.3 of guide for risk estimation)	%	6	3.9 ; 1.5		OLN ; MYS
P(RELEASE)=FULL_RELEASE	Percentage of transport events where there is a full release. (see definition of release categories in section 7.3 of guide for risk estimation)		1	0.1 ; 0		OLN ; MYS

Appendix I

DG scenarios (see table of allocation of DG scenarios)						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
P(FIRE_IGNITION)	Probability of ignition after a transport event					CL1
P(IGNITION)	Probability of ignition of a DG Class 2 flammable gas when a release occur		0.9			CL2 flammable gases
P(VCE)	Probability of Vapor Cloud Explosion after ignition of a DG Class 2 flammable gas		0.25			(if ignited) CL2 flammable gases
P(Flash fire)	Probability of flash fire after ignition of a DG Class 2 flammable gas		0..25			(if ignited) CL2 flammable gases

Appendix I

P(Jet fire)	Probability of jet fire after ignition of a DG Class 2 flammable gas		0.5	(if ignited) CL2 flammable gases
P(FIRE)	Probability of fire ignition DG Class 2 flammable gas after VCE, Flash fire or Jet fire phase.		1.0	CL2 flammable gases
P(IGNITION)	Probability of fire ignition of a DG Class 3 release		0.65	CL3
P(POOL_FIRE)	Probability of pool fire a DG Class 3 release		See table of allocation	(if ignited) CL3
P(VCE)	Probability of Vapor Cloud Explosion of a DG Class 3 release		See table of allocation	(if ignited) CL3
P(Toxic cloud)	Probability of forming a toxic could when a release occur		1.0	Relevant DG classes
P(BLEVE)	Probability of forming a BLEVE consecutively to a transport event		See guide for risk estimation	

Appendix I

Human Vulnerabilities						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
IN_BUILDINGS_VH_DENS	Density of person located inside buildings	N/m^2				
IN_BUILDINGS_VH_N	Number of person located inside buildings	N				
IN_BUILDINGS_VH_PROT_PRCT	Percentage of protection against DG hazards offered to persons located inside buildings	%	0	0	0	
IN_SUR_PFAC_VH_N	Number of users of public facilities in the surrounding of the described infrastructure	N				
IN_SUR_PFAC_VH_PROT_PRCT	Percentage of users of public facilities in the surrounding of the described infrastructure that are considered protected from hazards	%	0	0	0	
IN_SUR_POP_DENS	Population density in the surrounding of the described infrastructure	N/km^2				

Appendix I

IN_SUR_POP_PROT_PRCT	Percentage of the population in the surrounding of the described infrastructure that are considered protected from hazards	%	0	0	0	
IN_SUR_SPEC_VH_N	Number of people in the surrounding of the infrastructure that are located in specific locations	N				
IN_SUR_SPEC_VH_PRCT_BAND1	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND2	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND3	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND4	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND5	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND6	Percentage of people located in the considered bandwidth	%				

Appendix I

IN_SUR_SPEC_VH_PRCT_BAND7	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND8	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND9	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PRCT_BAND10	Percentage of people located in the considered bandwidth	%				
IN_SUR_SPEC_VH_PROT_PRCT	Percentage of people in the surrounding of the infrastructure that are located in specific locations that are considered protected from hazards	%	0	0	0	
IN_VEHICLES_DENS	Density of persons that are in vehicles on the infrastructure network	N/km				
IN_VEHICLES_VH_N	Number of persons that are in vehicles on the infrastructure network	N				
IN_VEHICLES_VH_PROT_PRCT	Percentage of protection against DG hazards offered to persons located in vehicles	%	0	0	0	

Appendix I

ON_NET_VHSTAFF_N_PKM	Density of the staff operating on the infrastructure network	N/km				
ON_NET_VHSTAFF_PROT_PRCT	Percentage of staff operating on the infrastructure network that are considered protected from hazards	%	0	0	0	
ON_NET_VHUSR_N_PKM	Density of the users of the infrastructure network	N/km				
ON_NET_VHUSR_PROT_PRCT	Percentage of the users of the infrastructure network that are considered protected from hazards	%	0	0	0	
ON_NETWORK	Percentage of person located on the network premises	%				
ON_NETWORK_N	Number of person located on the network premises	N				
POP_DENS	Population density	N/km2				
POP_DENS_PRCTV_DIR1 (H)	Variation in percentage of the population density per hour of the day in direction 1 (right hand side)	%				
POP_DENS_PRCTV_DIR2 (H)	Variation in percentage of the population density per hour of the day in direction 2 (right hand side)	%				
POP_PUBF_PRCTV_DIR1 (H)	Variation in percentage of the people present in public facilities in direction 1 (right hand side)	%				

Appendix I

POP_PUBF_PRCTV_DIR2 (H)	Variation in percentage of the people present in public facilities in direction 2 (right hand side)	%				
POP_INFUSR_PRCTV_DIR1 (H)	Variation in percentage of the people present within the infrastructure premises (not in vehicles) per hour of the day in direction 1 (right hand side)	%				
POP_INFUSR_PRCTV_DIR2 (H)	Variation in percentage of the people present within the infrastructure premises (not in vehicles) per hour of the day in direction 2 (right hand side)	%				
POP_STAFF_PRCTV_DIR1 (H)	Variation in percentage of staff present within the infrastructure premises (not in vehicles) per hour of the day in direction 1 (right hand side)	%				
POP_STAFF_PRCTV_DIR2 (H)	Variation in percentage of the staff present within the infrastructure premises (not in vehicles) per hour of the day in direction 2 (right hand side)	%				
POP_SPECL_PRCTV_DIR1 (H)	Variation in percentage of people present at specific locations in the surrounding of the infrastructure premises per hour of the day in direction 1 (right hand side)	%				
POP_SPECL_PRCTV_DIR2 (H)	Variation in percentage of people present at specific locations in the surrounding of the infrastructure	%				

Appendix I

	premises per hour of the day in direction 2 (right hand side)					
SPECLOC_VH_N_CELL	Number of human located in a specific grid cell	N				
SPECLOC_VH_N_SEG	Number of human located in specific cells of a given segment	N				
TOT_ON_NET_VH_N	Total number of people within the infrastructure premises allocated to a given segment	(integer)				
TOT_ON_NET_VH_PROT_PRCT	Percentage of people within the infrastructure premises allocated to a given segment that are considered protected from hazards	%	0	0	0	
TOT_VH_N	Total number of people allocated to a given segment	(integer)				
TOT_VH_PROT_PRCT	Percentage of people allocated to a given segment that are considered protected from hazards	%	0	0	0	

Appendix I

Risk estimation model						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
AV_IN_VEHICLES	Average number of persons per vehicle	N				
F	Frequency	1/y				
P	Probability or conditional probability					
S	Severity					
BANDWIDTH_1	Distance from the infrastructure border at which ends the bandwidth 1	m				
BANDWIDTH_2	Distance from the infrastructure border at which ends the bandwidth 2	m				
BANDWIDTH_3	Distance from the infrastructure border at which ends the bandwidth 3	m				

Appendix I

BANDWIDTH_4	Distance from the infrastructure border at which ends the bandwidth 4	m				
BANDWIDTH_5	Distance from the infrastructure border at which ends the bandwidth 5	m				
BANDWIDTH_6	Distance from the infrastructure border at which ends the bandwidth 6	m				
BANDWIDTH_7	Distance from the infrastructure border at which ends the bandwidth 7	m				
BANDWIDTH_8	Distance from the infrastructure border at which ends the bandwidth 8	m				
BANDWIDTH_9	Distance from the infrastructure border at which ends the bandwidth 9	m				
BANDWIDTH_10	Distance from the infrastructure border at which ends the bandwidth 10	m				
CF	Correction factor (1 = no correction)					
EV	Expected value	N/y				

Appendix I

F/N	Frequency / Number of fatalities					
F_DGSC	Frequency of damages by the considered Dangerous Goods Scenario	1/y				
F_Release	Frequency of DG release	1/y				
F0	Frequency of a DG event	1/y				
F1	Frequency of a transport event	1/y	**see F1 tables**			
GRID_TYPE	Dimensional grid type for risk estimations					
IR	Individual risk					
N_DGSC	Number of vulnerabilities damaged by the considered Dangerous Goods Scenario					
N_HRS	Number of hours					
N_FAT	Number of fatalities					
N_INJ	Number of injuries					
N_ITEMS	Number of quantified individual items					

Appendix I

N_SQM	Number of square meters					
P1	Conditional probability to involve a DG transport unit in a transport event					
R(DGR, N FAT)	Indicator of the risk posed by the dangerous goods releases (DGR) with a number N of fatalities (N FAT)					
ToD	Time of day	h				
VEHICLES_DENS	Number of vehicles per km located on the network	N/km				
VEHICLES_N	Number of vehicles located on the network	N				
VEHICLES_N_SEG	Number of vehicles located on one segment of the network	N				

Appendix I

Decision-making						
Parameter name (Aphabetic order)	**Short definition**	**Unit**	**Default value (if applicable)**			**Ref. scope of the value setting**
			RL	**RD**	**IWW**	
DMP	Decision-making principle					
DMP1	The consideration that any change made to technical, human and operation systems shall not introduce new uncontrolled safety risks which may lead to a regression of the safety of the system under assessment	[- - - to +++]				
DMP2	The continuous improvement principle is reflecting the constant effort, over time, to reduce the risks posed by the Transport of Dangerous Goods as far as reasonably practicable	[- - - to +++]				
DMP3	The consideration of the utility for the society to perform a certain level of transport of dangerous goods operations posing risks.	[- - - to +++]				

Appendix I

DMP4	This principle is devoted to the assessment of admissible variations of risk levels posed to different groups of persons	[- - - to +++]				
DMP5	Consideration of new situation(s) resulting from a risk management decision where the risk is unexpectedly transferred to another party in an uncontrolled manner and/or is increased instead of being reduced.	[- - - to +++]				
DMI	Decision-making indicator					
RMO	Risk management objective					
RMO1	Compliance with legal requirements	[- - - to +++]				
RMO2	Manage risks in accordance with best practice	[- - - to +++]				
RMO3	Inform and involve all concerned parties about the risk situation as required	[- - - to +++]				
RMO4	Reduce the risk level if economically practicable and proportionate to the issue to be solved	[- - - to +++]				
RMO5	Identify if the risk situation can be addressed appropriately by the primary risk owner alone	[- - - to +++]				

Appendix I

RMO6	Avoid solutions involving uncontrolled risk shifting	[- - - to +++]				
RMO7	Ensure risks are monitored on a regular basis at all levels	[- - - to +++]				
RMO8	Evaluate whether implemented solutions deal sufficiently with the identified risk situation	[- - - to +++]				
RMO9	Separation of risk management duties	[- - - to +++]				
RMS	Risk management strategy (Acceptance, Reduction, Transfer, Elimination)	[A, R, T, E]				

Appendix I

List of parameters with fixed values

Parameter name (Aphabetic order)	Short definition	Unit	Default set value (Y/N)			Reference scope of the value setting
			RL	RD	WW	

EUROPEAN UNION AGENCY FOR RAILWAYS

Making the railway system work better for society.

System Proposal for COR Safety Management Data

COMMON OCCURRENCE REPORTING PROJECT

Document Type: Technical document

Document ID: ERA-PRG-004-TD-008

Origin: European Union Agency for Railways

Activity Based Item: 2. An harmonized approach to safety / Learning for better safety (WP2017)

Unit: Safety

Sector: Strategy and Safety Performance

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Signature	Signed	Signed	Signed

Document History

Version	*Date*	*Comments*
1.0	23/11/2017	First draft version for external consultation

1. Table of Contents

1.1. List of Figures

No table of figures entries found.

1.2. List of Tables

2. References, definitions and abbreviations

2.1. Reference Documents

Table 1 Table of Reference Documents

[Ref. N°]	*Title*	*Reference*	*Version*
[1]	Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety (recast)	2016/798	OJ: L138/102 of 26/05/2016
[2]	Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union (recast)	2016/797	OJ: L138/44 of 26/05/2016
[3]	Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008 on the inland transport of dangerous goods (Text with EEA relevance)	2008/68	As amended by 2016/2309
[4]	Commission Directive (EU) 2016/2309 of 16 December 2016 adapting for the fourth time the Annexes to Directive 2008/68/EC of the European Parliament and of the Council on the inland transport of dangerous goods to scientific and technical progress (Text with EEA relevance)	2016/2309	OJ L 345, 20.12.2016
[5]	Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC) N° 881/2004	2016/796	OJ: L138 of 26/05/2016
[6]	Commission Regulation (EU) No 1078/2012 of 16 November 2012 on the common safety method for monitoring to be applied by railway undertakings, infrastructure managers after receiving a safety certificate or safety authorisation and entities in charge of maintenance	1078/2012	OJ: L320/8 of 17/11/2012
[7]	COR project plan	Project Plan ERA-PRG--004	V2.0
[8]	Commission Regulation (EU) No 376/2014 of the European Parliament and of the Council on the reporting, analysis and follow-up of occurrences in civil aviation	376/2014	OJ L 122, 24.4.2014, p. 18–43
[9]	DNV study Assessment of Existing National Occurrence Reporting Regimes and Systems	1LDI90Z-12	Task 1, Rev. 2

2.2. Definitions and Abbreviations

2.2.1. Standard Terms and Abbreviations

The general terms and abbreviations used in the present document can be found in a standard dictionary. Furthermore, a glossary of railway terms that focuses primarily on safety and interoperability terminology, but also on other areas that the Agency can use in its day-to-day activities as well as in its Workgroups for the development of future publications, is available on the Agency website.

2.2.2. Specific Terms and Abbreviations

Table 2 Table of Terms

Term	*Definition*
Agency	The European Union Agency for Railways such as established by the Regulation (EU) No 2016/796 of the European Parliament and of the Council of 11 May 2016
Anonymisation	the removal from occurrence reports of all personal details relating to the reporter and to the persons mentioned in occurrence reports and any details, including the name of the organisation(s) involved in the occurrence, which may reveal the identity of the reporter or of a third party or lead to that information being inferred from the occurrence report;
Employee or contractor	Any person whose employment is in connection with a railway and is at work at the time of the accident, incident or near miss including the staff of contractors, self-employed contractors, the crew of the train and persons handling rolling stock and infrastructure installations
Hazard	A condition that could lead to an accident (Art.3. (13) Of Regulation (EU) 402/2013 – CSM for Risk Assessment).
Interested party	any natural or legal person or any official body, whether or not having its own legal personality, that is in a position to participate in the improvement of railway safety by having access to information on occurrences exchanged by the Member States and which falls within one of the categories of interested parties set out in Annex IV;
Just culture	A culture in which front-line operators or other persons are not punished for actions, omissions or decisions taken by them that are commensurate with their experience and training, but in which gross negligence, wilful violations and destructive acts are not tolerated;
Occurrence	Occurrence means any safety-related event which endangers or which, if not corrected or addressed, could endanger a train or any rolling stock, its passengers, staff or any other person, and includes in particular an accident and incident.
point of contact	(a) where a request for information is made by an interested party established in a Member State, the national reporting authority designated by each Member State in accordance with paragraph 5.5.1; (b) where a request for information is made by an interested party established outside the Union, the Agency;
Risk	The frequency of occurrence of accidents and incidents resulting in harm (caused by a hazard) and the degree of severity of that harm. (Art.3.(1) of Regulation (EU) 402/2013 – CSM for risk assessment)
Reporter	A natural person who reports an occurrence or other safety-related information pursuant to future COR system
TDG Occurrence	An occurrence as defined in section 1.8.5 of the 'RID' annex of Directive (EU) 2008/68

Table 3 Table of Abbreviations

Abbreviation	*Meaning*
AsBo	Assessment body
COR	Common Occurrence Reporting
CSM	Common safety method
DeBo	Designated body
ERAIL	European railway accident information links
IM	Infrastructure Manager
MS	Member state
NIB	National investigation body
NSA	National Safety Authority
NOR	National occurrence reporting
NoBo	Notified body
RSD	Railway Safety Directive
RU	Railway Undertaking
System proposal	System Proposal for COR Safety Management Data
SMD	Safety management data
TDG CAs	TDG Competent Authorities referred to in section 1.8.5.1 of 'RID' annex to Directive (EU) 2008/68 collecting information on TDG occurrences
TDG	Transport of Dangerous Goods
WP	Working party

3. Purpose of the document

This paper forms part of the Agency's Common Occurrence Reporting project and builds on previous consultation papers on Designing the common occurrences and taxonomy, Legislation, Phasing and Roles, use of data and governance. The purpose of this paper is to present a structure and content for System Proposal for COR Safety Management Data.

It is important to note that:

- The System Proposal proposed in this document is supported by the accompanied impact assessment, which consists of the necessary cost-benefit analysis of considered different options.
- **There will be further opportunities to refine System proposal, as it is foreseen in the COR project plan after discussions and consultations with stakeholders (particularly on legislation and taxonomy paper) in 2016, that the future COR system should be defined by the legislation i.e. CSM on COR. Thus, when the decision will be taken by the Commission to issue a mandate for CSM on COR, considerable work will be needed, working with stakeholders, to develop, and agree as far as possible, a recommendation, according to the Agency normal working procedures. In this case, the system proposed in this document is to be considered as a starting point and will facilitate the discussion in the WP for CSM on COR. Clearly the scope of CSM on COR mandate might have an influence on the structure of the system and the reporting scheme.**
- The results of the study on the "Use of data and analytics techniques in railways to support better management of the risk of accident" might also contribute to develop a better system, taking into account the future needs to improve data analytics. Also, this point might be for discussion in the WP for CSM on COR.

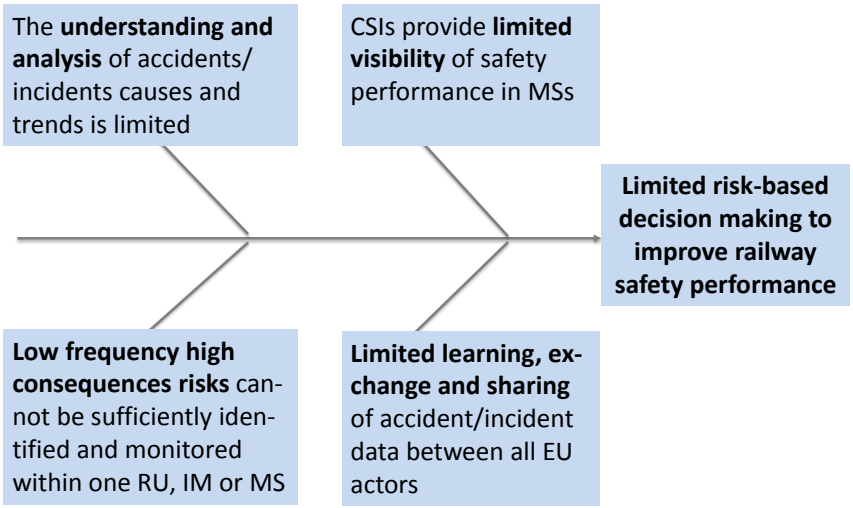
4. Background

The Agency started to work on the Common occurrence project in 2015. The first project plan was issued in 2016 and an updated version in 2017. So far, the following results were achieved regarding COR SMD:

- 5 papers on different future COR system topics
- 3 workshops with stakeholders
- 5 consultations with stakeholders

This work provided a solid basis for the impact assessment and for the system definition proposed in this document which is now published for consultation with the stakeholders. A dedicated workshop will be arranged to facilitate the discussion (see paragraphs 6 and 7).

4.1. Context and problem definition



For more details, please see Impact assessment section 1.

4.2. Objectives

General objective:

Contribute towards **better risk-based decision making to improve railway safety performance**

Specific objectives:

- **SO1** Improve **risk profiling and modelling techniques** regarding accidents and incidents
- **SO2** Ensure **broader visibility** of safety performance in Member States
- **SO3** Enable **identifying and monitoring** low frequency high consequence risks
- **SO4** Improve **learning, exchange and sharing** of accident / incident data between all EU actors

For more details, please see Impact assessment section 2.

4.3. Options which were considered in the Impact assessment

Options for data content

Building block	Baseline	Minimum (Option 1)	Medium (Option2)	Maximum (Option 3)
Reportable occurrences and taxonomy	Aggregated CSIs	CSIs +taxonomy	CSIs +additional incidents +taxonomy	CSIs +additional incidents +taxonomy

Reporting scheme	Mandatory	Mandatory	Reporting CSIs mandatory; Reporting additional incidents voluntary.	Mandatory
Scope	RUs/IMs operations			
Entry and quality of data on EU level	NSA	Ensured by the National Reporting Authority (NRA) e.g. NSA/NIB/TDG CA/Sector association, etc. appointed by the Member State.		

IT options

IT building block which varies with Min, Med, Max options			
Reporting system	No IT system	EU IT system & national IT systems are not connected	EU IT system & national IT systems are connected
Functionality for data visualization and analytics	No	Optional	Yes

For more details, please see Impact assessment section 3. Impacts of the options are provided in section 4, comparison of options and preferred option which is the basis for System proposal in section 5. Impact assessment supported option 1 as the preferred option.

5. System proposal

5.1. Subject matter

The system proposal aims to improve railway safety by ensuring that information on safety-related accidents and incidents is reported, collected, stored, protected, exchanged, disseminated and analysed. This exchange of information will help to ensure:

- that different railway actors could fulfil their roles and responsibilities and improve their decision-making framework (more details are available in the roles paper and the impact assessment (objectives));
- that, where appropriate, safety action is taken in a timely manner based on analysis of the information collected;
- the continued availability of safety information by introducing rules on confidentiality and on the appropriate use of information and through the harmonised and enhanced protection of reporters and persons mentioned in occurrence reports;
- that railway safety risks are considered and dealt with at both EU level and national level;
- that the sole objective of occurrence reporting is the prevention of accidents and incidents and not to attribute blame or liability.

5.2. Scope

Scope – future COR reportable occurrences have to be reported from RUs/IMs service operations (passenger, freight, transport of dangerous goods, etc.) in all EU MSs. Shunting operations are also in the scope. The COR regime should also be applicable to Switzerland, Norway, Channel Tunnel and potentially also to third countries.

It should be mentioned, that most of the stakeholders who provided comments during the previous consultations considered that including ECMs and occurrences detected during maintenance in the scope of COR would need further work, both in term of taxonomy and roles description. This is why, as a first step, the Agency proposes to focus firstly on reporting by RUs and IMs as they are the closest to operation and so most of the occurrences. This aims to facilitate the implementation of a COR regime at the level of the organisations primarily concerned with them. However, if in time the need to include ECMs in the scope of COR is confirmed, this possibility and the related needs will be further considered at a later stage. This could be achieved during future revisions of CSM on COR.

Based on the Taxonomy paper and result of impact assessment, future suggested reportable occurrences are provided in **Annex I** and suggested accompanied taxonomy is provided in the **Annex II**.

Nevertheless, future COR reportable occurrences and the taxonomy will be finalised by the WP of CSM on COR, in collaboration with the JCGE[1] concerning TDG occurrences. Annex I and Annex II will be considered as a starting point for the discussion in the WP.

5.3. Definitions

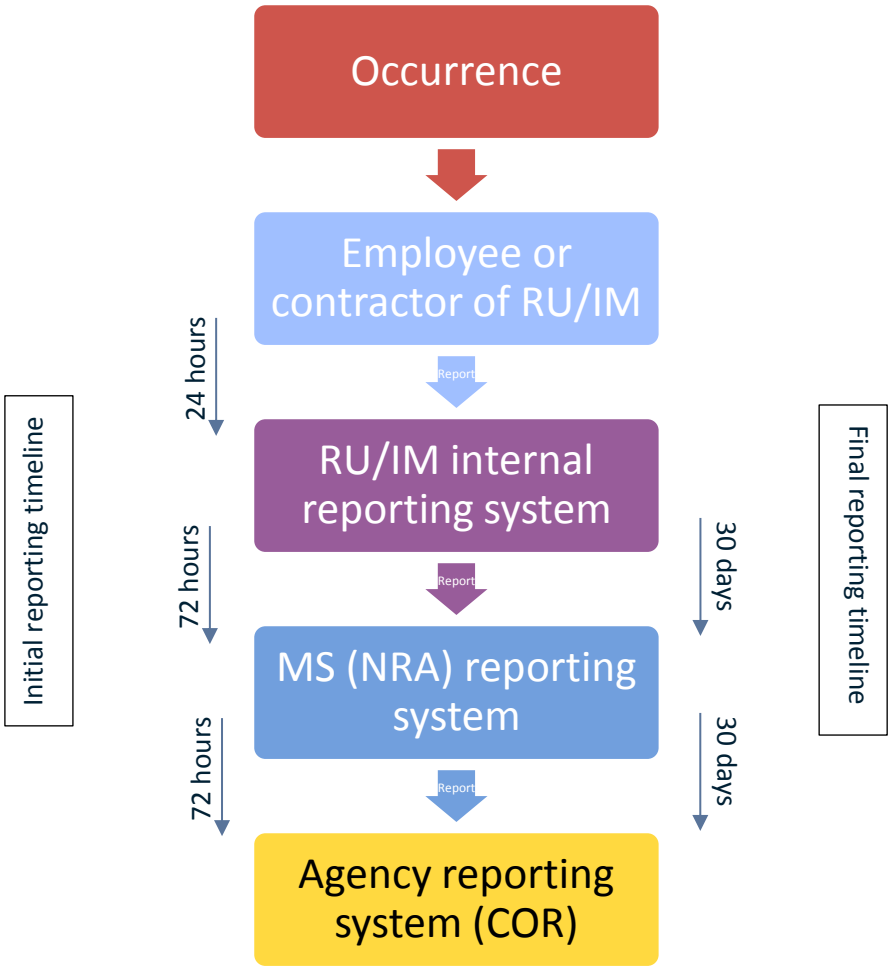
Definitions of reportable occurrences and the taxonomy are provided in **Annex III**. However, it is important to note:

- occurrence definitions were taken from the Taxonomy paper, which was consulted with the stakeholders;
- thresholds are also defined by the definitions, e.g. serious, significant as defined by the CSIs;
- the Agency recognise that clear and agreed definitions for reportable occurrences, causes and consequences are essential and can take considerable work to refine. **This work will be finalised when the Agency receives a mandate to develop CSM on COR, a working group will be created to develop detailed definitions which would be directly applicable to all Member States**. **Annex III will be considered as a starting point for the discussion in the WP;**
- there will be a user guide to help reporters as well. When the future EU COR IT tool will be developed, the Agency will also elaborate all necessary procedures and guidelines for the users.

COR system definitions relating to TDG services should be defined by TDG CAs who will report their definitions to the WP of CSM on COR or TDG CAs experts could be invited to participate in the WP.

[1] JCGE: Joint Coordinating Group of Experts as defined in the conclusions of the RID/ATMF working group (TECH-16050).

5.4. Reporting scheme and timing



Graph 1. Mandatory reporting scheme and timing

Based on the results of the impact assessment, the future COR reporting scheme should be mandatory and established through legislation (mandate for CSM on COR). This also implies the following:

- Each RU/IM should establish, in their SMS and in line with the CSM on Monitoring, an internal mandatory reporting system to collect and share at least the occurrences referred to in Annex I with the supporting taxonomy referred to Annex II. This information should be reported by employees or contractors of RUs/IMs.
- Each Member State should establish a mandatory reporting system[2] to facilitate the collection of details of occurrences collected by RUs/IMs. Therefore, existing national reporting systems will need to be structured and changed to be in line with future CSM on COR.
- The Agency should establish a mandatory reporting system to facilitate the collection of details of occurrences collected by Member States.

Following initial reporting the following timeline is proposed:

1. The employees or contractors of the RUs/IMs should report occurrences internally as soon as possible and in any event within 24 hours of becoming aware of the occurrence, unless exceptional

[2] DNV study showed that only 1 MS has not established mandatory national reporting system

circumstances prevent this (therefore there should be a list of such circumstances or there should be a process by which employees could report later and justify why it was late).

2. Following notification of an occurrence, any RU/IM should report to the national reporting authority (more explanation of the national reporting authority concept is provided in paragraph 5.5.1) of that Member State, the details of occurrences collected in accordance with Annex I and Annex II as soon as possible, and in any event no later than 72 hours after becoming aware of the occurrence.
3. Following notification of an occurrence, each national reporting authority of that Member State should report to the Agency the details of occurrences collected in accordance with Annex I and Annex II as soon as possible, and in any event no later than 72 hours after becoming aware of the occurrence.

The following final reporting timeline is proposed:

1. When RU/IM completes the investigation, occurrence reports should be transferred to the national reporting authority within 30 days.
2. Occurrence reports should be transferred to the EU COR IT tool no later than 30 days after having been entered in the national database.

This proposed time frame to report initial notification of the occurrence was developed taking into account findings from the DNV study[3] and in order to provide the possibility for NIBs to inform the Agency about starting the investigation of an occurrence in accordance with Article 25 of RSD. As it will be explained in paragraph 5.5, the intention of the Agency is to replace the ERAIL with the future EU COR IT tool.

There should be a distinction between immediate report of an occurrence to respective NSA/NIB and providing data of the occurrence to the EU COR system. Reporting reportable occurrences to the national database or EU COR IT tool does not take/lift off the responsibility of the MSs to ensure the obligation of RUs/IMs or, where appropriate NSAs/TDG CAs to notify the accidents and incidents to the NIB as determined by Article 22 of RSD. However, if the NIB is managing the national database or has full access to the national database and notification to national database is considered as a notification of the accident/incident to NIB in the national legislation, Article 22 of RSD could be considered as fulfilled (in order to avoid double reporting).

However, the Agency view is that other arrangements than an IT tool are likely to be more suitable and efficient (such as, for example, a phone call) to achieve the need of urgent notifications to NIBs by RU/IM (which would imply availability and resource constraints regarding the use of an IT tool). This view has been confirmed by most of the stakeholders consulted. Therefore, such an option to use the future EU COR IT tool for the purpose of urgent notifications to NIBs was not further explored.

Mandatory details of occurrences collected in accordance with Annex I and Annex II, which will have to be reported by the RU/IM within the initial notification will be determined by the WP of CSM on COR. At least the following mandatory fields should be considered: the date, time and place of the occurrence, as well as its type and its consequences as regards fatalities, injuries and material damage. Other mandatory complimentary details of the occurrences would have to be submitted later on, when the investigation of the occurrences is completed (final report) or when all necessary data is available. Occurrence reports should be also updated whenever necessary with additional information. **Established reporting rules should define in advance minimum information for each time-step of notifications which should be agreed within the WP of CSM on COR.**

Also, it should be noted that depending on the occurrence not all taxonomy information will be relevant and should be reported. For example, if there is a broken rail, no information regarding rolling stock will be submitted because it was not relevant to the occurrence. It was assumed that depending on the occurrence categorical differences and only the relevant taxonomy information on the occurrence should be submitted.

[3] DNV study showed that usually internally occurrence is reported within 3 days or less.

So, in some cases, some parts of the taxonomy would be non-relevant and in some cases it could be not mandatory to fill them or if the information is not available for primary notification, it could be updated in the final notification. The Agency does not have any intention of creating an unnecessary burden on reporters, understanding that this would undermine the use of the system. The level of detail required should be proportionate to the occurrence to ensure the taxonomy is limited to essential and mandatory fields. This process has to be followed in the new system design and build and agreed within the WP of CSM on COR.

Taking into account the revised RSD and CSI approach and consultation of the stakeholders, within the chain of occurrences the Agency proposes that each occurrence shall be reported under the type of the primary occurrence, even if the consequences of the secondary occurrence are more severe (e.g. a derailment followed by a fire. Reportable occurrence in this case will be derailment).

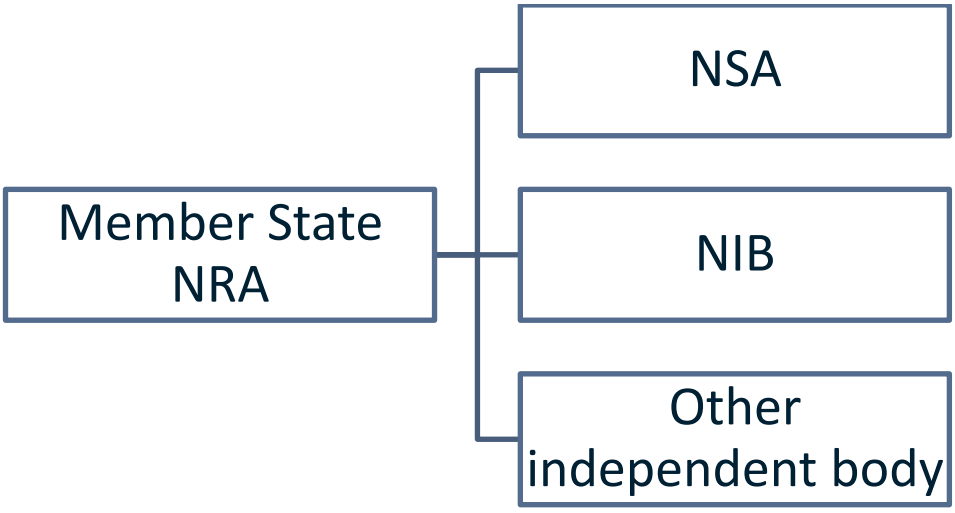
5.5. Data management

5.5.1. Data collection and storage

Graph 2. Promoting just culture within the occurrence reporting process by different actors

Each RU/IM should designate one or more persons to handle independently the collection, evaluation, processing, analysis and storage of details of occurrences reported under Annex I and Annex II. The handling of the reports should prevent the use of information for purposes other than safety, and should appropriately safeguard the confidentiality of the identity of the reporter and any persons mentioned in occurrence reports. As a part of a just culture, the confidential reporting is creating trust in the systems for those who report. Any breach in this trust will possibly affect the willingness to report and will therefore potentially have a negative effect on the operational safety.

By agreement with the national reporting authority, RUs/IMs may put in place a simplified mechanism for the collection, evaluation, processing, analysis and storage of details of occurrences. They may share those tasks with organisations of the same nature, while complying with the rules on confidentiality and protection of the future COR system.



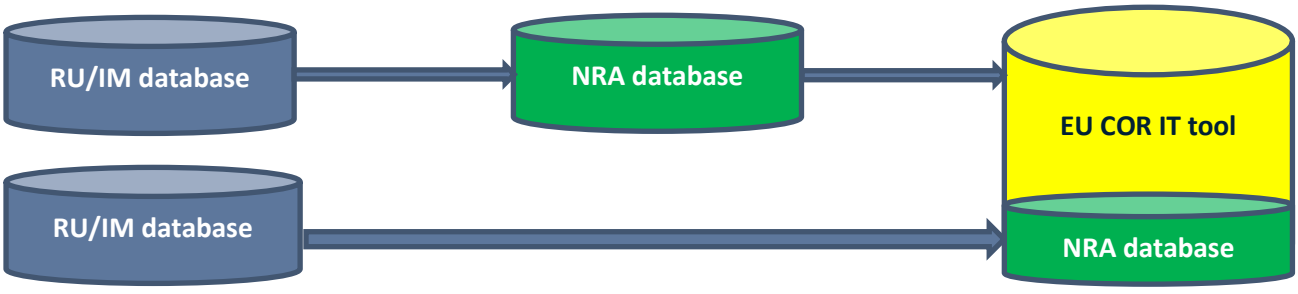
Graph 3. Possible national reporting authorities designated by the Member State

Each Member State should designate one or more national reporting authorities to establish a mechanism to independently collect, evaluate, process, analyse and store details of occurrences reported under Annex I and Annex II. The handling of the reports should prevent the use of information for purposes other than safety, and should appropriately safeguard the confidentiality of the identity of the reporter and any persons mentioned in occurrence reports, with a view to promoting a 'just culture'. The national reporting authorities which should be designated by the Member State, either jointly or separately, are the following[4]:

- the national safety authority; and/or
- the national investigation body; and/or
- any other already existing independent body or entity based in the EU that is entrusted with this function (e.g. TDG CA, sector association, etc.).

Where a Member State will designate more than one body or entity, it should designate one of them as a point of contact for the transfer of information referred to in paragraph 5.6.

The Agency should designate one or more of its staff members to establish a mechanism to independently collect, evaluate, process, analyse and store details of occurrences reported in accordance with Annex I and Annex II. The handling of the reports should prevent the use of information for purposes other than safety, and should appropriately safeguard the confidentiality of the identity of the reporter and any persons mentioned in occurrence reports, with a view to promoting a 'just culture'.



Graph 4. Data collection and storage in the different actors' databases

[4] DNV study showed that usually NOR is managed by NIB or NSA or IM or sector association (e.g. RSSB)

RUs/IMs should store occurrence reports, drawn up on the basis of details of occurrences collected in accordance with Annex I and Annex II in one or more internal databases.

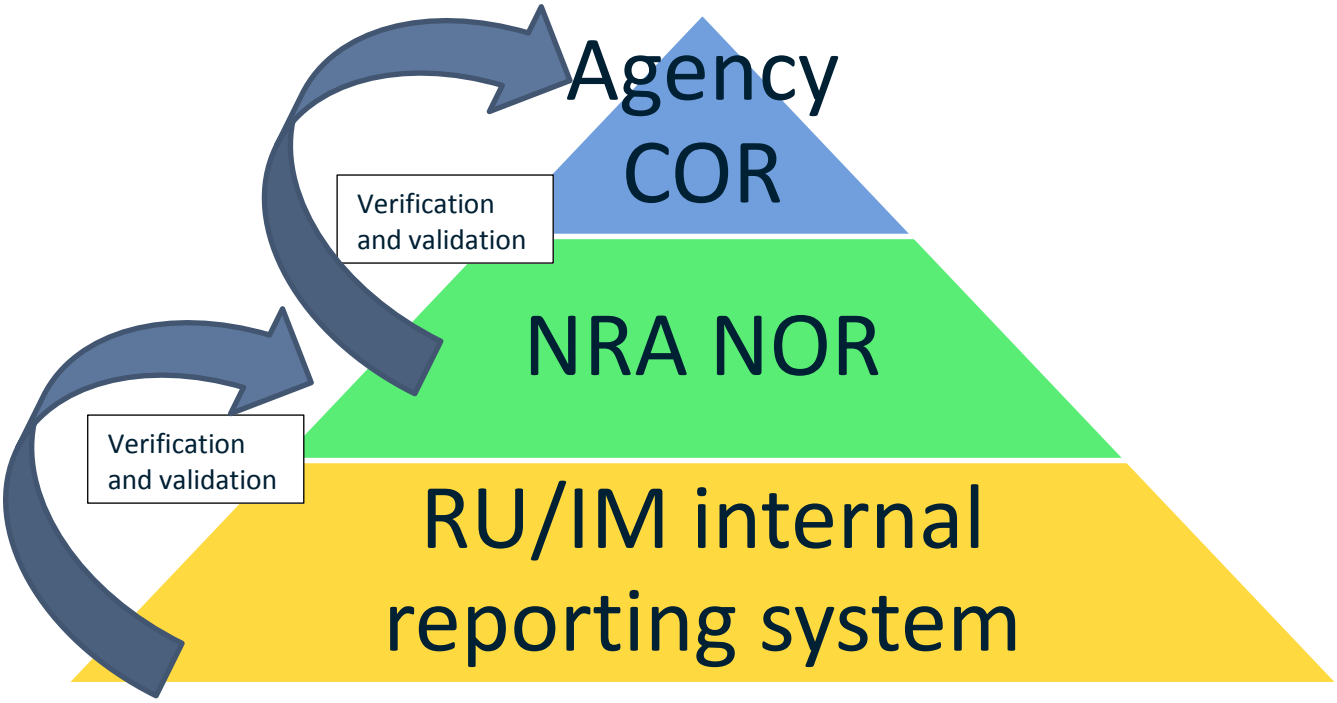
The national reporting authorities should store occurrence reports, drawn up on the basis of details of occurrences collected in accordance with Annex I and Annex II in a national database. If the national reporting authority doesn't have a national database, it could use the EU COR IT tool to establish one, more details are provided in paragraph 5.6.

Relevant information on accidents and incidents collected by national investigation bodies could also be stored in the national database.

The Agency should store occurrence reports, drawn up on the basis of details of occurrences collected in accordance with Annex I and Annex II in an EU database – EU COR IT tool, more details are provided in paragraph 5.6. The information from the NRA database (within or outside EU COR IT tool) would be forwarded the centralised EU COR IT tool.

If the NIB decides to investigate a particular accident or incident, after the investigation is completed, the NIB should store at the EU COR IT tool the final investigation report, and when available, a summary in English of the final investigation report and addressed safety recommendations i.e. the same what is done in ERAIL at the moment (see section 5.6.1 for more details).

5.5.2. Data quality assurance



Graph 5. Data quality checking processes by different reporting actors

It is proposed that the final occurrence reports referred to in Annex I should contain at least the information listed in Annex II (taxonomy). However, as it was mentioned before, **the final list of reportable occurrences and taxonomy and mandatory fields for initial and final notification of the occurrence will be determined by the WP of CSM on COR.**

RUs/IMs, Member States and the Agency should establish data quality checking processes to improve data consistency, notably between the information collected initially and the final report stored in the database.

The databases referred to in paragraph 5.5.1 should use formats which are standardised to facilitate information exchange with the EU COR IT Tool and be compatible with the Annex I and Annex II. This has still to be explored further in the later stages of the COR project.

The Agency should support the national reporting authorities of the Member States in their task of data integration, including for example in:

- the integration of the information referred to in Annex I and Annex II; and
- the establishment of data quality checking processes referred to this paragraph.

The Agency should provide that support in such a way as to contribute to the harmonisation of the data entry process across Member States, in particular by providing to staff working in the RUs/IMs, national reporting authorities and the Agency:

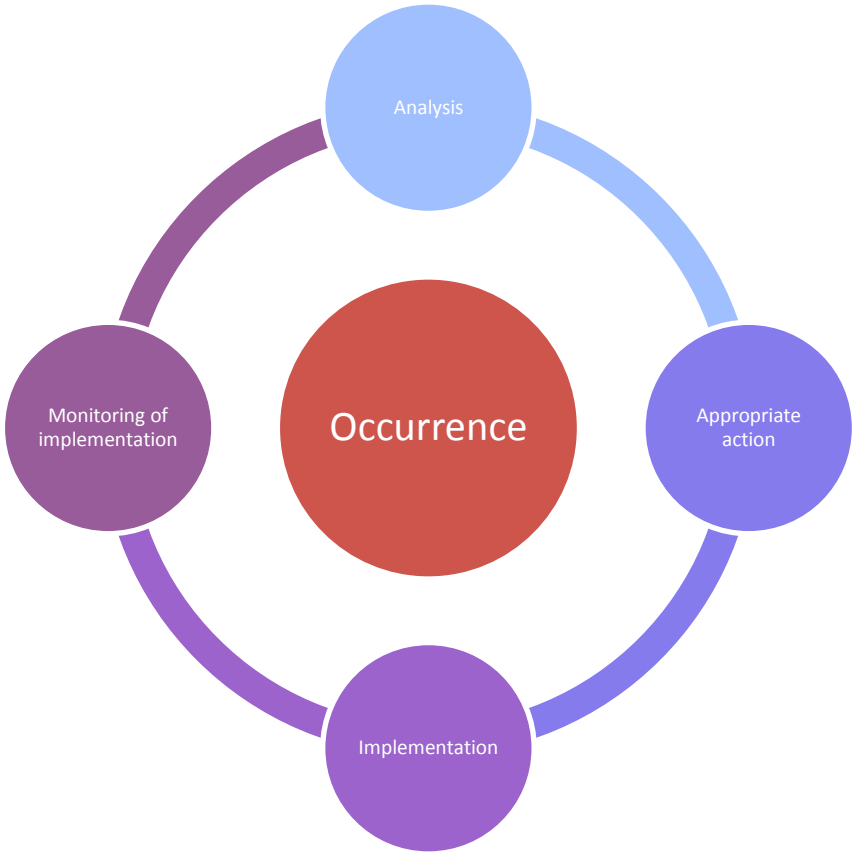
- guidance material;
- workshops; and
- appropriate training.

Each national reporting authority is responsible for the data quality assurance of their respective MS occurrence reports.

Another approach could be to define common mandatory quality process for all actors. This could be done by CSM on COR.

Furthermore, future EU COR IT tool should also contain automatic data quality control check in order to ensure quality and consistency of the occurrence reports. More details are provided in paragraph 5.6.

5.5.3. Data analysis



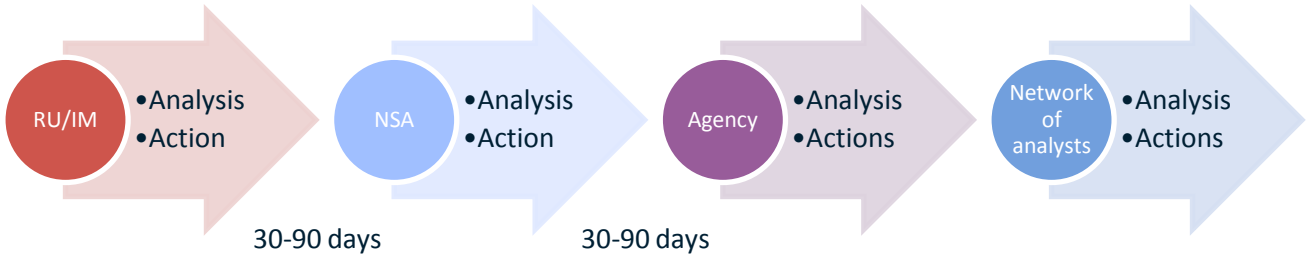
Graph 6. General process of data analysis by different actors

Each RU/IM shall develop a process to analyse occurrences collected in accordance with paragraph 5.4 in order to identify the safety hazards associated with identified occurrences or groups of occurrences. Based on that analysis, each RU/IM shall determine any appropriate corrective or preventive action, required to improve railway safety. This is in line with CSM on Monitoring, which implies that each RU/IM shall implement an internal reporting and monitoring scheme.

When, following the above mentioned analysis, the RU/IM identifies any appropriate corrective or preventive action required to address actual or potential railway safety deficiencies, it shall:

- implement that action in a timely manner; and
- establish a process to monitor the implementation and effectiveness of the action.

Each RU/IM shall regularly provide its employees and contractors with information concerning the analysis of, and follow-up on, occurrences for which preventive or corrective action is taken.



Graph 7. Workflow of data analysis results by different actors

Where RU/IM identifies an actual or potential railway safety risk as a result of its analysis of occurrences or group of occurrences reported pursuant to paragraph 5.4, it should transmit to the national reporting authority of that Member State, within 30 days from the date of notification of the occurrence by the reporter:

- the preliminary results of the analysis performed, if any; and
- any action to be taken.

RU/IM should report the final results of the analysis, where required, as soon as they are available and, in principle, no later than three months from the date of notification of the occurrence (except for occurrences which are being investigated by the NIB).

A national safety authority of a Member State may request RU/IM to transmit to it the preliminary or final results of the analysis of any occurrence of which it has been notified, but in relation to which it has received no follow-up or only the preliminary results.

Where a national safety authority established in a Member State identifies an actual or potential railway safety risk as a result of its analysis of occurrences or group of occurrences reported pursuant to paragraph 5.4, it should transmit to the Agency, within 30 days from the date of notification of the occurrence by the reporter:

- the preliminary results of the analysis performed, if any; and
- any action to be taken.

The national safety authority should transmit to the Agency the final results of the analysis, where required, as soon as they are available and, in principle, no later than three months from the date of notification of the occurrence.

The Agency may request national safety authorities to transmit to it the preliminary or final results of the analysis of any occurrence of which it has been notified, but in relation to which it has received no follow-up or only the preliminary results.

Each national safety authority and the Agency should develop a process to analyse the information relating to occurrences which are directly reported to them in accordance with paragraph 5.4 in order to identify the safety hazards associated with those occurrences. Based on that analysis, they should determine any appropriate corrective or preventive action each at their level required to improve railway safety.

When, following the analysis referred to this paragraph, a national safety authority or the Agency identifies any appropriate corrective or preventive action required to address actual or potential railway safety deficiencies, it should:

- implement that action in a timely manner; and
- establish a process to monitor the implementation and effectiveness of the action.

For each occurrence or group of occurrences monitored in accordance with paragraph 5.4, each national safety authority should have access to the analysis made and should appropriately monitor action taken by the RUs/IMs for which it is respectively responsible.

If a national safety authority concludes that the implementation and the effectiveness of the reported action is inappropriate to address actual or potential safety deficiencies, it should ensure that additional appropriate action is taken and implemented by the RU/IM.

Where available, information relating to the analysis and the follow-up of individual occurrences or groups of occurrences obtained pursuant to this paragraph should be stored in the EU COR IT tool, in a timely manner and no later than two months after their storage in the national database.

National safety authority and Member States should use information obtained from the analysis of occurrence reports to identify remedial action to be taken, if any, within the annual safety plans accordingly with Article 4(g) of RSD.

In order to inform the public about of the level of safety in railways, each national safety authority should publish a safety review at least once a year. The safety review should:

- contain aggregated and anonymised information on the type of occurrences and safety-related information reported through its national mandatory and voluntary reporting systems if any;
- identify trends;
- identify the action it has taken.

National safety authorities may also publish anonymised occurrence reports and risk analysis outcomes.

Safety review could be provided in the NSA’s annual report.

The Agency and the national safety authorities of the Member States should, in collaboration, participate regularly in the exchange and analysis of information contained in the EU COR IT tool. Without prejudice to the confidentiality requirements laid down in the future COR system, observers (RU/IM) may be invited on a case-by-case basis, where appropriate or as a permanent members.

The Agency and the national safety authorities of the Member States should collaborate through a network of railway safety analysts. The setting up of such a collaborative group at EU level was broadly supported by the stakeholders during previous consultations. The network of railway safety analysts should contribute to the improvement of railway safety in the EU, in particular by performing safety risk analysis. In addition, The Agency and the network of analysts should provide any advice for future changes to EU COR IT tool technical specification and revisions of CSM on COR to the Commission.

The Agency should support the activities of the network of railway safety analysts by, for example, providing assistance for the preparation and organisation of the meetings of the network.

The Agency should include information about the result of information analysis in the safety report referred to Article 35 of Agency regulation.

Similar platforms of exchange could also be envisaged at a national level in order to define and agree on priorities relevant at national level. This supports also better sharing of experience and knowledge at a local level that cannot reasonably reach through European group. Some Member States have already set such cooperation/coordination groups in order to identify areas of improvement on safety issues, facilitating cooperation on safety matters across the industry and sharing of good practices, with positive results (e.g. System Safety Risk Group managed by RSSB in UK, feedback meetings in France managed by EPSF).

5.6. System governance

5.6.1. IT System definition and interfaces

The Agency should manage an EU COR IT tool (a European Centralised Data Repository) to store all occurrence reports collected in the EU. The Agency should also adopt the arrangements and procedures for the management of the EU COR IT tool.

Each Member State should, in agreement with the Agency, update the EU COR IT tool by transferring to it all information relating to safety occurrences stored in the national databases referred to paragraph 5.4. The Agency should agree with the Member States the technical protocols for transferring to the EU COR IT tool all occurrence reports collected by the national reporting authorities, particularly for occurrences stored in the national occurrence databases.

Taking into account results of the impact assessment, EU COR IT tool should be connected with the national reporting IT tools or systems. Data exchange between national IT system and the EU IT tool could be based on manual integration (with some IT support) or on a fully developed IT interface. The individual national occurrence reporting systems should each provide their reports to the Agency in an automatized manner with no human interaction needed if possible.

However, it is worth noting that the previous experience of the Agency in creating an interface between national databases and European systems has shown that many technical and organisational issues can arise and lead to very time consuming and costly solutions (e.g. vehicle registers). The main issue is the different architectures of the national systems which makes the connection of all the Member States extremely complicated and unreliable.

Thus, if there would be no technical possibility to connect the EU COR IT tool with the national IT tool, manual entry or an import tool for a structured preformatted file loaded with national reporting information could be considered as an option. In case where a MS does not have a specific IT tool and database to manage national occurrence reporting system, the Agency should provide an additional functionality within the EU COR IT tool to include a national occurrence reporting IT tool and database within the EU IT tool. In this particular case the national reporting authority would be still responsible for a data quality check. In addition, the data after the quality check will be consistent and easily transferable to the EU COR database. Functionality for data visualisation and analytics should be also considered in the EU COR IT tool.

National databases might need to be modified if necessary to support collecting reportable occurrences and the proposed taxonomy (in order to be in line with Annex I and Annex II and definitions). When EU COR IT tool is established, the ERAIL system could be discontinued if it provides all the same functionalities and collects the same necessary data (in particular NIB reports and CISs). In this case, no double reporting from NSAs would be required, it will be possible to extract CSI data from the EU COR IT tool. Furthermore, possible migration of the NIB ERAIL system to COR system to support NIB reporting to the Agency and provide the link to a NIB report of investigated occurrences could be implemented.

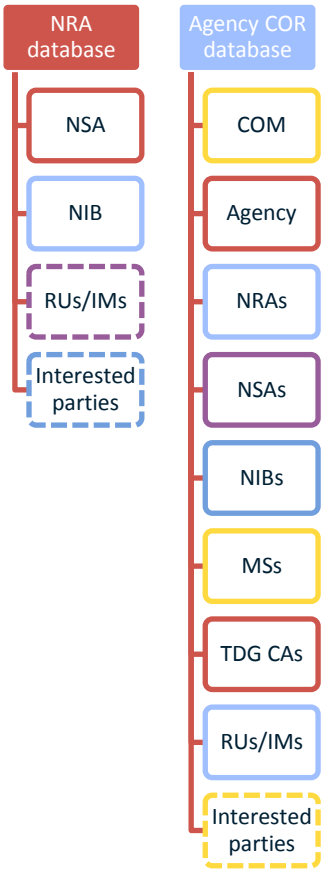
In the long term strategy the EU COR IT tool could be considered as one reporting tool for reporting occurrences within the EU (a unique centralised data repository, where the national databases will be closed and all the occurrence reporting will be done at EU level with a centralised system). Then MSs do not have to spend resources on their own IT tools development. Also, the double reporting will be removed (from the national database to EU IT tool). However, this is not proposed from the beginning of the future COR system as it was not supported by the stakeholders. From the generic comments received by the stakeholders, the solution of a unique and centralised database was not supported. The importance of the national systems has been often strongly underlined. Nonetheless, this option could be considered in the future revisions of CSM on COR.

During the development of EU COR IT tool technical specification, the Agency should consider:

- A multilingual reporting functionality (reporting fields). Free text could be reported in English in order for everybody to understand the details of the occurrences unless automatic translation tools could be implemented if available;
- the possibility of marking the occurrence on the map to help the reporter and to ensure the quality of the reporting location;
- the possible interaction of the EU COR IT tool with the register of infrastructure (RINF) and European Vehicle Register;
- the possibility of automatically identifying the accident type (serious, significant) when the consequences of the accident are known and reported;
- the possibility to report a chain of events;
- the extraction of CSIs data;
- the reporting of NIB investigation reports and related safety recommendations;
- the possibility of reporting both the reported causes identified through the investigation conducted internally by the RU/IM and the causes finally identified by the NIB through its investigation, which would be determined by a set of rules (e.g. If COR system will be replacing ERAIL, then when the NIB decide to investigate the occurrence the RU should not be obliged to report causes).
- the risks related to security issues (cybersecurity/hacking);
- the implementation of agreed confidentiality and reporting rules;
- to 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;
- to 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. It is clear, that when reporting in future COR IT tool the reporting rules could suggest a primary component (occurrence) and then any relevant objects (person, train, track, etc.) for that occurrence appear in the data flow to add to the event depending on the occurrence.
- an automatic data quality control check in order to ensure quality and consistency of the occurrence reports;
- a functionality for data visualisation and analytics;
- the COR IT solution providers should supply the technical infrastructure of the system and ensure data protection, data integrity and the overall system security;
- to provide the functionality of the national occurrence database within the EU COR IT tool for Member States, which does not have IT tools or databases
- to envisage a link to company code reference file within the Agency reference data set.
- Etc.

The final technical specification of the future EU COR IT tool should be also discussed with the stakeholders and this is planned already in the COR project. Consultation and input should also be considered within the WP of a CSM on COR.

5.6.2. Dissemination of information stored in the EU COR IT tool and national databases



Graph 8. Access of different actors to different databases

Member States and the Agency should participate in an exchange of information by making all information relating to safety stored in their respective reporting databases available to the national reporting authorities of the other Member States, the Agency and the Commission, through the EU COR IT tool.

A Member State or the Agency should forward all pertinent safety-related information to the relevant authority of the Member State or the Agency as soon as possible if, while collecting details of occurrences or when storing occurrence reports or carrying out an analysis in accordance with paragraph 5.5.3, it identifies safety matters which it considers either:

- to be of interest to other Member States or the Agency; or
- to possibly require safety action to be taken by other Member States or the Agency.

This could be also done through the network of analysts.

National investigation bodies should have full access to their respective national database for the purpose of discharging their responsibilities pursuant to Articles 20-26 of RSD.

National safety authorities of Member States should have full access to their respective national database for the purposes of their safety-related responsibilities pursuant to Article 16-19 of RSD.

In addition, any entity entrusted with regulating railway safety (i.e. the European Commission, Agency, NSAs, NIBs, TDG competent authorities, Member states), within the EU should have secure full online access to information on occurrences contained in EU COR IT tool. The information should be used in accordance with paragraph 5.7.

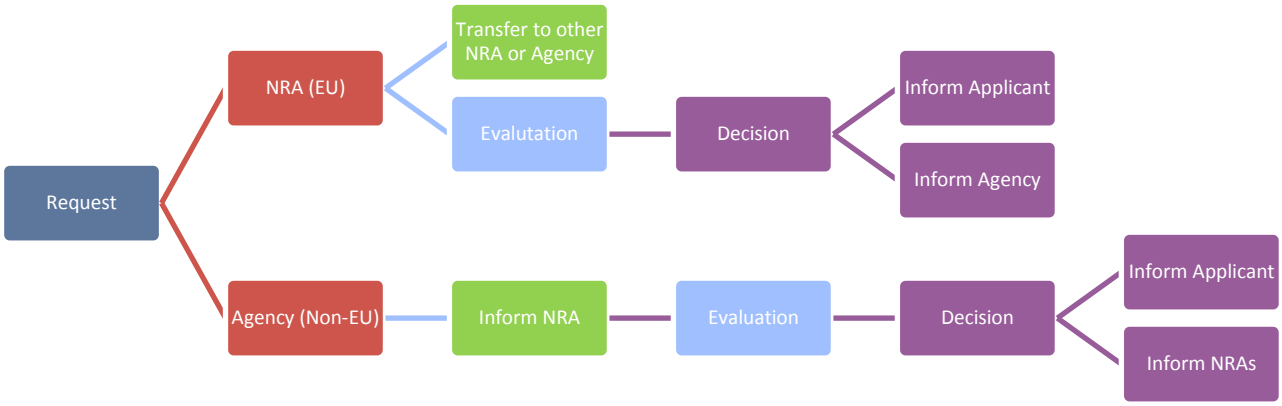
Last, but not least, RUs/IMs should have access to the EU COR IT database to fulfil the roles and responsibilities defined by the legislation as well.

Interested parties listed in Annex IV may request access to certain information contained in the EU COR IT tool. Interested parties established within the EU should address requests for information to the point of contact of the Member State in which they are established. Interested parties established outside the EU should address their request to the Agency. The Agency should inform the national reporting authority of the Member State concerned when a request is made. Information contained in the EU COR IT tool relating to ongoing safety investigations conducted in accordance with Articles 20-26 of RSD (NIB investigations) should not be disclosed to interested parties.

For each category of above mentioned different actors, user access policies should be developed and agreed with the concerned stakeholders.

For security reasons, interested parties should not be granted direct access to the EU COR IT tool. **However, another approach, which could be considered is to provide direct access directly to interested parties under predefined user policy rights**. Stakeholders' views on that are welcomed.

5.6.3. Processing of requests and decisions



Graph 9. General process flow of processing of requests by the EU and Non-EU interested parties

Requests for information contained in the EU COR IT tool should be submitted using forms approved by the point of contact. Those forms should contain at least the items set out in Annex V.

A point of contact which receives a request should verify that:

- the request is made by an interested party;
- it is competent to deal with that request.

Where the point of contact determines that another Member State or the Agency is competent to deal with the request, it should transfer it to that Member State or to the Agency, as appropriate.

A point of contact which receives a request should evaluate on a case-by-case basis whether the request is justified and practicable. A point of contact may supply information to interested parties on paper or by using a secure electronic means of communication.

Where the request is accepted, the point of contact should determine the amount and the level of information to be supplied. Without prejudice to paragraph 5.7., the information should be limited to what is strictly required for the purpose of the request.

Information unrelated to the interested party's operations or field of activity should be supplied only in aggregated or anonymised form. Information in a non-aggregated form may be provided to the interested party if it provides a detailed written justification. That information should be used in accordance with paragraph 5.7.

A point of contact receiving a request from an interested party listed in Annex IV may take a general decision to supply information on a regular basis to that interested party, provided that:

- the information requested is related to the interested party's own equipment, operations or field of activity;
- the general decision does not grant access to the entire content of the database;
- the general decision relates to only anonymised information.

The interested party should use the information received pursuant to this paragraph, subject to the following conditions:

- the interested party should use the information only for the purpose specified in the request form, which should be compatible with the objectives of paragraph 5.1; and
- the interested party should not disclose the information received without the written consent of the information provider and should take the necessary measures to ensure appropriate confidentiality of the information received.

The decision to disseminate information should be limited to what is strictly required for the purpose of its user.

5.6.4. Record of requests and exchange of information

The point of contact should record each request received and the action taken pursuant to that request. That information should be transmitted in a timely manner to the Agency whenever a request is received and/or action is taken.

The Agency should make available the updated list of requests received and action taken by the various points of contact and by the Agency itself to all points of contact.

5.7. Data protection and confidentiality

5.7.1. Confidentiality and appropriate use of information

Member States and organisations, in accordance with their national law, and the Agency should take the necessary measures to ensure the appropriate confidentiality of the details of occurrences received by them. Each Member State, each organisation established in a Member State, or the Agency should process personal data only to the extent necessary for the purposes of the COR system (e.g. user registration in the IT tool) and without prejudice to national legal acts implementing Directive 95/46/EC.

Information derived from occurrence reports should be used only for the purpose for which it has been collected. Member States, the Agency and organisations should not make available or use the information on occurrences:

- in order to attribute blame or liability; or
- for any purpose other than the maintenance or improvement of railway safety.

The Agency and the national reporting authorities of the Member States, when discharging their obligations under paragraph 5.5.3 in relation to the information contained in the EU COR IT tool, should:

- ensure the confidentiality of the information; and
- limit the use of the information to what is strictly necessary in order to discharge their safety-related obligations without attributing blame or liability; in this respect, the information should be used in particular for risk management and for analysis of safety trends which may lead to safety recommendations or actions, addressing actual or potential safety deficiencies.

Member States should ensure that their national reporting authorities and their competent authorities for the administration of justice cooperate with each other through advance administrative arrangements or national laws. These advance administrative arrangements or national laws should seek to ensure the correct balance between the need for proper administration of justice, on the one hand, and the necessary continued availability of safety information, on the other.

5.7.2. Protection of the information source

For the purposes of this paragraph, 'personal details' includes in particular names or addresses of natural persons.

Each organisation established in a Member State should ensure that all personal details are confidential to the staff of that organisation except persons designated in accordance with paragraph 5.5.1 in order to investigate occurrences with a view to enhancing railway safety. Anonymous information should be disseminated within the organisation as appropriate.

Each Member State should ensure that no personal details related to occurrences are ever recorded in the national database. Such anonymous information should be made available to all relevant parties, for example to allow them to discharge their obligations in relation to railway safety improvement.

The Agency should ensure that no personal details related to occurrences are ever recorded in the Agency database (EU COR IT tool). Such anonymous information should be made available to all relevant parties, for example to allow them to discharge their obligations in relation to railway safety improvement.

Member States and the Agency should not be prevented from taking any action necessary for maintaining or improving railway safety.

Without prejudice to the applicable national criminal law, Member States should refrain from instituting proceedings in respect of unpremeditated or inadvertent infringements of the law which come to their attention only because they have been reported. This should not apply in the following situations cases:

- in cases of wilful misconduct, gross negligence or destructive acts;
- where there has been a manifest, severe and serious disregard of an serious risk and profound failure of professional responsibility to take such care as is evidently required in the circumstances, causing foreseeable damage to a person or property, or which seriously compromises the level of railway safety.

Member States may retain or adopt measures to strengthen the protection of reporters or persons mentioned in occurrence reports. Member States may in particular apply this rule without the exceptions referred before (i.e. wilful misconduct, etc.).

If disciplinary or administrative proceedings are instituted under national law, information contained in occurrence reports should not be used against:

- the reporters; or
- the persons mentioned in occurrence reports.

This should not apply in the cases referred before (i.e. wilful misconduct, etc.).

Member States may retain or adopt measures to strengthen the protection of reporters or persons mentioned in occurrence reports. Member States may in particular extend that protection to civil or criminal proceedings.

Member States may adopt or maintain in force legislative provisions ensuring a higher level of protection for reporters or for persons mentioned in occurrence reports.

Except where specific cases (i.e. wilful misconduct, etc.) apply, employees and contractors who report or are mentioned in occurrence reports collected should not be subject to any prejudice by their employer or by the organisation for which the services are provided on the basis of the information supplied by the reporter.

Each organisation established in a Member State should, after consulting its staff representatives, adopt internal documentation describing how 'just culture' principles are guaranteed and implemented within that organisation.

5.7.3. Access to documents and protection of personal data

With the exception of paragraphs 5.7.1 and 5.7.2, which establish stricter rules on access to the data and information contained in the EU COR IT tool, Regulation (EC) No 1049/2001 should apply. In addition, national legal acts implementing Directive 95/46/EC should be respected as well as Regulation (EC) No 45/2001.

5.8. Risk classification scheme

It is not proposed from the beginning, that a risk classification scheme should be implemented in the future COR system, i.e. in the initial scope of CSM on COR. However, in the COR project a separate paper on the long term evolution of risk modelling and safety management data is expected to be delivered in 2018. This paper should bring together the results of the TDG roadmap (Risk estimation and decision-making guides for TDG), the study into Big Data and the potential to combine the benefits with the Safety Management Data work. Also, a separate study[5] by DNV has been conducted already and could be taken into account. It could be possible that at the time the paper is delivered and consulted on with the stakeholders (several stakeholders have already mentioned the need to define a risk classification scheme in order to classify each occurrence according to their related risks, allowing a proper risk-based approach and in order to proportionate investigations of occurrences to those that are really relevant), the mandate for CSM on COR could be amended to introduce risk classification scheme or introducing this scheme could be postponed for future revisions on CSM on COR. However, some NORs already having developed a different methodology for such risk classification, there will be a need to further consider and discuss the need or not for an harmonised approach within a future working party at a later stage of the project.

The idea behind is that the occurrence reports referred to in Annex I could include a safety risk classification for the occurrence concerned. That classification could be reviewed and if necessary amended, and could be endorsed by the national reporting authority of the Member State or the Agency, in accordance with the common European risk classification scheme which could be developed. The common European risk classification scheme could be introduced via a CSM on COR.

The Agency in close cooperation with the Member States and through the network of railway safety analysts with the cooperation of sector organisations, could develop a common European risk classification scheme to enable the RUs/IMs, Member States and the Agency classify occurrences in terms of safety risk. In so doing, the Agency could take into account the need for compatibility with existing risk classification schemes.

The Agency might also consider supporting authorities and stakeholders in decision-making and prioritisation by developing (IT) tools for analytic hierarchy processes (e.g. visual risk modelling techniques – as an example) and risk classification methods. However, it is important to recognise that developing a data set, analysis and models can only support railway actors making their own assessments of their own risks, and

[5] http://www.era.europa.eu/Document-Register/Pages/Research-on-risk-models-at-European--level.aspx

should not become a risk model that would assume or replace the responsibility of railway operators to perform their risk assessment of their own risks.

Nonetheless, the risk classification scheme is not in the initial System proposal for the future COR system.

5.9. Entry into force and application

As mentioned above, the future COR system should be finalised by the CSM on COR. The WP for the CSM on COR will propose the entry into force and application dates for future COR system and in particular a CSM on COR. The possibility of phasing the work could be taken into account for consideration in the WP.

5.10. Historical data

Data from existing Member State national occurrence reporting regimes could be imported into the EU COR IT tool to establish a searchable historical record. However, because of different scopes and system taxonomy proposals and NOR, it would be likely to be incomplete in some aspects. Nevertheless, this aspect could be discussed in the WP of CSM on COR in order to take any further decisions.

5.11. Penalties

Member States shall lay down the rules on penalties applicable to infringements of any future CSM on COR (especially considering situations when an RU/IM does not report as required). The penalties provided for should be effective, proportionate and dissuasive. Member States should notify to the Commission those provisions and any subsequent amendment affecting them[6].

5.12. Audits of CSM on COR implementation

The Agency should have the right in the future to audit implementation CSM on COR in order to check how CSM on COR is implemented within the Member States. This could be considered under already developed auditing programmes within the Agency (e.g., NSA monitoring, cross-audit, matrix, etc.) or creating separate one.

5.13. Limitations of the proposal

This proposal is a result of internal Agency work carried out according to the COR project plan with the contributions of different stakeholders during various previous consultations on different COR papers and topics. It should be noted that the Agency does not have direct access to all MSs NOR systems. Thus, it was not possible to include these other systems as part of the in-depth analysis carried out. The Agency did not investigate how historical data can be catered for in a future COR system, but this could be done when designing a final EU COR IT tool. **As it was stated before several times, this proposal should be considered as a starting point for the discussions in the WP of CSM on COR when the Agency will receive the mandate from the Commission.**

5.14. Future possible changes for the COR scope

Clearly, during implementation of the future COR system, reportable occurrences and taxonomy could be changed from lessons learned and from the experience of the users and the Agency. Thus, there should be

[6] Article 30 of RSD

established clear change control procedure in the future CSM on the COR or the Agency procedures (e.g. Change Control Management procedure) taking into account a cost-benefit analysis of proposed changes.

5.15. Link with the Safety culture project

The implementation of a COR system is intended to support improvement of the reporting culture within the EU rail system, and therefore the safety culture within RUs/IMs and authorities (please refer to safety culture project for further details).

5.16. Link with the TDG Roadmap

The implementation of a COR system is intended to support the reporting of TDG occurrences which will also have to collect relevant information for supporting the implementation of the 'Guide on Inland TDG risk estimations' to be published in 2018. As foreseen from the beginning of the COR project the needs of the future TDG Roadmap developments will be considered for the future developments of the COR system.

6. Proposed next steps

To support the consultation on the System proposal and the Impact assessment, the Agency will organize a workshop on **10th** and **11th** of **January 2018**. During that workshop the Agency will present this System proposal together with the Impact Assessment and the main implication of the conclusions that can be drawn from them and expects to collect the views and suggestions on the key issues. In particular, the following key questions/issues should be answered:

General questions to stakeholders during consultation process:

1. **Do you agree on the proposed subject matter for future COR? If no, please provide justification.**
2. **Do you agree on the proposed scope for future COR? If no, please provide justification.**
3. **Do you have any comments for Annex I on the proposed list of reportable occurrences? Please provide justification.**
4. **Do you have any comments for Annex II on the proposed taxonomy for the reportable occurrences? Please provide justification.**
5. **Do you have any comments for Annex III on the proposed definitions? Please provide justification.**
6. **Do you agree on the proposed reporting schemes and timings? If no, please provide justification.**
7. **Do you agree on the proposed occurrence reporting process? If no, please provide justification.**
8. **Do you agree with the proposed possible national reporting authorities which should be designated by the Member States? If no, please provide justification.**
9. **Do you agree on the proposed process of data collection and storage in the different actors databases? If no, please provide justification.**
10. **Do you agree on the proposed data quality checking processes by different reporting actors? If no, please provide justification.**
11. **Do you agree on the proposed general process of data analysis by different actors? If no, please provide justification.**
12. **Do you agree on the workflow of data analysis results by different actors? If no, please provide justification.**
13. **Do you support the idea of establishing network of safety analysts at EU level? If no, please provide justification.**
14. **Do you have any comments on IT System definition and interfaces? Please provide justification.**
15. **Is something missing what the Agency should consider for future IT tool specification? Please provide justification.**

16. **Do you agree on the proposed access of different actors to different databases? If no, please provide justification.**
17. **Do you agree with the list of Interested parties in the Annex IV? If no, please provide justification.**
18. **Do you agree on the proposed content of the request which is provided in Annex V? If no, please provide justification.**
19. **Do you agree with the concept that interested parties should not be granted direct access to the EU COR IT tool? If no, please provide justification.**
20. **Do you agree with the general process flow of processing of requests by the EU and Non-EU interested parties? If no, please provide justification.**
21. **Do you have any comments on data protection and confidentiality? Please provide justification.**
22. **Do you agree that the risk classification scheme should not be introduced for first proposal on COR and could be considered in the future revisions of CSM on COR? If no, please provide your justification.**
23. **Please provide any comments for paragraphs on entry into force and application, historical data, penalties, audits of CSM on COR implementation.**

7. Consultation process

All relevant parties are invited to give their views, comments, and suggestions regarding this System Proposal and accompanied Impact Assessment. All contributions will be welcomed and considered by the Agency. During the consultation period, the COR project team would be happy to answer queries and requests for discussions or meetings, subject to our inevitable resource constraints.

The following consultation dates are expected for the consultation: **from 24/11/2017 till 23/02/2018**. Comments and positions should be sent within the consultation period and by using provided comment sheet in **Annex VI** (also available as a template on the Agency extranet page for this work). Comments should be sent to **COR@era.europa.eu**. Please make it clear if you are NOT content to have your consultation responses published on the Agency extranet.

After dedicating workshop and received comments during the consultation process the Agency will review all submitted comments and suggestions using the mentioned comment sheets. Then, the Agency will update the System proposal and publish a second version in **April 2018**.

Annex I – Reportable occurrences

A	**Accidents**
A1	**Collision**
A1.1	**Collision of train (or vehicle) with rail vehicle**
A1.1.1	• *Front to Front*
A1.1.2	• *Front to End*
A1.1.3	• *Side (including front to side or side to side)*
A1.2	**Collision of train with obstacle within the clearance gauge**
A1.2.1	• *with objects fixed on or near the track*
A1.2.1.1	○ *with buffer stops*
A1.2.1.2	○ *with (part of) infrastructure (equipment) within clearance gauge*
A1.2.1.3	○ *with other fixed objects*
A1.2.2	• *with objects temporarily present on or near the track*
A1.2.2.1	○ *with animals (excluding birds)*
A1.2.2.2	○ *with rocks*
A1.2.2.3	○ *with landslides*
A1.2.2.4	○ *with trees*
A1.2.2.5	○ *with lost parts of railway vehicles*
A1.2.2.6	○ *with lost or displaced loads*
A1.2.2.7	○ *with vehicles and machines or equipment for track maintenance*
A1.2.2.8	○ *with road vehicles*
A1.2.2.9	○ *with other temporary objects*
A1.2.3	• *with overhead contact lines*
A2	**Derailment of train (or vehicle)**
A3	**Level Crossing Accident**
A3.1	• *with one or more crossing vehicles*
A3.2	• *with crossing users (e.g. pedestrians)*
A3.3	• *with other objects temporarily present on or near track if lost by a crossing vehicle or user*
A4	**Accidents to persons involving rolling stock in motion**

A4.1	• *person hit by a railway vehicle (or by an object attached to, or that has become detached from, the vehicle)*
A4.2	• *person falling from railway vehicle*
A4.3	• *person falling or being hit by loose objects when travelling on board vehicles*
A5	**Fire in Rolling Stock**
A5.1	• *Fire in Rolling Stock*
A5.2	• *Explosion in Rolling Stock*
A6	**Other accident**
A6.1	• *Electrocution*
A6.2	• *Other accident*
I	**Incidents**
	Indicators relating to precursors of accidents
I1	**Train Operations Failure**
I1.1	• *Signal passed at danger when passing a danger point*
I1.2	• *Signal passed at danger without passing a danger point*
I2	**Technical Failure of the vehicles**
I2.1	• *Broken wheel on rolling stock in service*
I2.2	• *Broken axle on rolling stock in service*
I2.3	• *Wrong side signalling (vehicle) failure*
I3	**Technical Failure of fixed installations**
I3.1	• *Broken rail*
I3.2	• *Track buckle and other track misalignment*
I3.3	• *Wrong side signalling (infrastructure) failure*

Annex II – Reportable taxonomy

1.	**Occurrence reference number**
2.	**Reporting Entity**
2.1	• Company reference number
2.2	• Reporter reference number
3.	**Occurrence notification status**
3.1	• Initial notification
3.2	• Interim notification (updated)
3.3	• Final notification
4.	**Occurrence identification**
4.1	• Date
4.2	• Local Time
4.3	• Location[7]
4.3.1	○ Country
4.3.2	○ National Line ID
4.3.2.1	○ For occurrence located on a section of line: Operational Points IDs Start and End ○ For occurrence located in an operational point (stations, sidings, switches, etc): Operational Point ID
4.3.2.2	○ Track or platform number (when relevant)
4.3.2.3	○ Railway location (distance from the origin of the line – for occurrence located on a section of line only)
4.3.3	○ Geographical coordinates (latitude / longitude)[8]
4.4	• RUs involved
4.5	• IM involved
5.	**Occurrence category**
5.1	• Accident
5.1.1	○ Serious accident

[7] The location details aim to provide a description of the infrastructure equipment. In order to facilitate the reporting, the parameters above (country, National line ID, Operational points, track number and railway location) correspond to existing RINF parameters. These allow then to retrieve all the information related to technical details of the infrastructure already reported in the RINF and will prevent additional reporting of the same information in the future COR system.

[8] The report of geographical coordinates will allow, in addition with information already included in the RINF, to provide precise geographic visualisation and mapping of occurrences (e.g. mapping of black spots).

5.1.2	○ Significant accident
5.2	• Incident
6.	**Occurrence description (free text)**
7.	**Rolling stock characteristics**
7.1	• Train type
7.1.1	○ Freight train
7.1.2	○ Passenger train
7.1.2.1	▪ High-speed train
7.1.2.2	▪ Conventional train
7.1.3	○ Engineering train\Maintenance rolling stock
7.2	• Composition
7.2.1	○ Locomotive
7.2.1.1	▪ Diesel
7.2.1.2	▪ Electric
7.2.1.3	▪ Hybrid
7.2.2	○ DMU
7.2.3	○ EMU
7.2.4	○ Wagons
7.2.5	○ Coaches
8.	**Transport of Dangerous Goods occurrence**
8.1	• Yes
8.1.1	○ Dangerous goods are released
8.1.1.1	▪ Yes
8.1.1.2	▪ No
8.2	• No
9.	**Signalling system characteristics**
9.1	• ERTMS
9.2	• Lineside signalling
9.3	• Cab signalling
9.4	• Other
10.	**Environmental relevant factor**
10.1	• Meteorology/Weather
10.1.1	○ Fog

10.1.2	○ Flooding
10.1.3	○ Frost
10.1.4	○ Ice
10.1.5	○ High winds
10.1.6	○ Storm
10.1.7	○ Snow
10.1.8	○ Heat
10.1.9	○ Other
10.2	• Landslide
10.3	• Rock/stone fall
10.4	• Earthquake
10.5	• Vegetation
10.6	• Light conditions
10.7	• Other
11.	**Associated occurrences\Chain of events** Occurrence reference number
12.	**Occurrence consequences** See 1.3 Occurrence consequences
13.	**Occurrence causes** See 1.4 Occurrence causes
14.	**Actions/Measures taken (free text)**
15.	**Link to NIB report (if relevant)**
16.	**Additional relevant information/documents/pictures**
17.	**Shunting Operations**

Taxonomy for Consequences

1.	**Casualties**
1.1	• *Passenger*
1.1.1	○ *Deaths*
1.1.2	○ *Serious Injuries*
1.2	• *Employee or Contractor*
1.2.1	○ *Deaths*
1.2.2	○ *Serious Injuries*

1.2	• *Level Crossing User*
1.2.1	○ *Deaths*
1.2.2	○ *Serious Injuries*
1.3	• *Trespasser*
1.3.1	○ *Deaths*
1.3.2	○ *Serious Injuries*
1.4	• *Other person at a platform*
1.4.1	○ *Deaths*
1.4.2	○ *Serious Injuries*
1.5	• *Other person not at a platform*
1.5.1	○ *Deaths*
1.5.2	○ *Serious Injuries*
2.	**Damage to Environment**
2.1	• *Yes*
2.1.1	○ *Costs*
2.1.2	○ *Description (free text)*
2.2	• *No*
3.	**Material damages to rolling stock**
3.1	• *Yes*
3.1.1	○ *Costs*
3.1.2	○ *Description (free text)*
3.2	• *No*
4.	**Material damages to infrastructure**
3.1	• *Yes*
3.1.1	○ *Costs*
3.1.2	○ *Description (free text)*
3.2	• *No*
5.	**Other Damages**
5.1	• *Yes*
5.1.1	○ *Type*
5.1.1.1	▪ *Structures/Buildings*
5.1.1.2	▪ *Objects*
5.1.1.3	▪ *Cargo*

5.1.1.4	▪ *Other*
5.1.2	○ *Description (free text)*
5.1.3	○ *Costs*
5.2	• *No*
6.	**Delays**
6.1	• *Passenger Trains*
6.1.1	○ *Number of trains*
6.1.2	○ *Number of total minutes*
6.2	• *Freight Trains*
6.2.1	○ *Number of trains*
6.2.2	○ *Number of total minutes*
6.3	• *Overall (sum of passenger and freight trains calculated automatically)*
6.3.1	○ *Number of trains*
6.3.2	○ *Number of total minutes*
7.	**Economic Impact of Occurrence** (sum in euro calculated automatically)

Taxonomy for Causes

1.	**Accidents**
1.1	**Collision**
1.1.1	**Collision of train with rail vehicle**
1.1.1.1	• Front to Front
1.1.1.2	• Front to End
1.1.1.3	• Side
1.1.2	**Collision of train with obstacle within the clearance gauge**
1.1.2.1	• with objects fixed on or near the track
1.1.2.1.1	○ with buffer stops
1.1.2.1.2	○ with (part of) infrastructure (equipment) within clearance gauge
1.1.2.1.3	○ with other fixed objects
1.1.2.2	• with objects temporarily present on or near track
1.1.2.2.1	○ with animals (excluding birds)
1.1.2.2.2	○ with rocks
1.1.2.2.3	○ with landslides
1.1.2.2.4	○ with trees

1.1.2.2.5	○ with lost parts of railway vehicles
1.1.2.2.6	○ with lost or displaced loads
1.1.2.2.7	○ with vehicles and machines or equipment for track maintenance
1.1.2.2.8	○ with road vehicles
1.1.2.2.9	○ with other temporary objects
1.1.2.3	• with overhead contact lines
1.2	**Derailment of train**
1.3	**Level Crossing Accident**
1.3.1	• with one or more crossing vehicles
1.3.2	• with crossing users (e.g. pedestrians)
1.3.3	• with other objects temporarily present on or near track if lost by a crossing vehicle or user
1.4	**Accidents to persons involving rolling stock in motion**
1.4.1	• person hit by a railway vehicle (or by an object attached to, or that has become detached from, the vehicle)
1.4.2	• person fall from railway vehicle
1.4.3	• person fall or are hit by loose objects when travelling on board vehicles
1.5	**Fire in Rolling Stock**
1.5.1	• Fire in Rolling Stock
1.5.2	• Explosion in Rolling Stock
1.6	**Other accident**
1.6.1	• Electrocution
1.6.2	• Other accident
2.	**Incidents**
2.1	**Train Operations Failure**
2.1.1	• Signal passed at danger when passing a danger point
2.1.2	• Signal passed at danger without passing a danger point
2.1.3	• Runaway train
2.1.4	• Wrong routing
2.1.5	• Train Over-speeding
2.1.6	• Loading Irregularity
2.1.6.1	○ Overweight
2.1.6.2	○ Oversized loading
2.1.6.3	○ Imbalanced loading

2.1.6.4	○ Insecure loading
2.1.6.5	○ Open door
2.1.7	• Train Composition Failure
2.1.8	• Train available for boarding or alignment outside platform
2.1.9	• Other (train operation failures)
2.2	**Technical Failure of the vehicles**
2.2.1	• Broken wheel on rolling stock in service
2.2.2	• Broken axle on rolling stock in service
2.2.3	• Wrong side signalling (vehicle) failure
2.2.4	• Braking system failure
2.2.5	• Losing of vehicle parts
2.2.6	• Traction Motor failure (electrical)
2.2.7	• Diesel engine failure
2.2.8	• Hot axle box
2.2.9	• Coupling failure
2.2.10	• Doors failure
2.2.11	• Suspension system failure
2.2.12	• Other (technical failure of the vehicle)
2.3	**Technical Failure of fixed installations**
2.3.1	• Broken rail
2.3.2	• Track buckle and other track misalignment
2.3.3	• Wrong side signalling (infrastructure) failure
2.3.4	• Switch and crossing failure
2.3.5	• Failure of the level crossing equipment
2.3.6	• Disorder of earthworks/embankment failure
2.3.7	• Structures failure
2.3.7.1	○ Tunnel failure
2.3.7.2	○ Viaduct failure
2.3.7.3	○ Culvert failures
2.3.7.4	○ Rail bridge structural failure
2.3.7.5	○ Over line bridge (e.g. pedestrian) failure
2.3.7.6	○ Station Structure failure
2.3.7.8	○ Platform failure

2.3.8	• Power supply equipment failure
2.3.9	• Train detection equipment failure
2.3.10	• Overhead contact line failure
2.3.11	• Fire of fixed installations
2.3.12	• Other (technical failure of fixed installations)
2.4	**Near Misses**
2.4.1	• with rail vehicle
2.4.2	• with road vehicle
2.4.3	• with person
2.4.4	• with other object
3.	**Human and Organisational Performance**
3.1	• ***Human function(s)*** [9] ***involved***
3.1.1	• *To provide power for train operations in normal operations, or situations where there are disruptions or engineering work*
3.1.1.1	○ *Take up power control duties*
3.1.1.2	○ *Monitor power*
3.1.1.3	○ *Provision of traction supply*
3.1.1.4	○ *Detect irregularity*
3.1.1.5	○ *Agreement of isolation*
3.1.1.6	○ *Formal agreement for control of the line*
3.1.1.7	○ *Apply isolation*
3.1.1.8	○ *Return of power / remove isolation*
3.1.2	• *To respond to incidents and occurrences, including arrangements for safety and initiation of remedial actions*
3.1.2.1	○ *Detect irregularity*
3.1.2.2	○ *Conduct immediate mitigation, containment*
3.1.2.3	○ *Gather and communicate incident information*

[9] The list of human function has been established following the study on human functions of University of Nottingham made for the Agency in 2013. The report of the human functions involved in an occurrence intends to classify and provide a view of the railway functions involved in the occurrences, in order to better highlight the areas where improvements/actions/measures might be necessary. This should be considered as a first attempt to enhance focus of investigation and report on those areas. Usually, it appears that such information are collected (either directly or indirectly in existing occurrence reporting system – mainly through free text) but rarely classified, undermining the focus of investigation of those areas.
The different human functions listed here are defined in the study and available on Agency's website.
However, in order to be more comprehensive, we recognize that this classification would need to be extended to other functions that might be involved in occurrence, such for instance as technical functions (of equipment) or regulatory functions (from NSAs, the Agency).

3.1.2.4	○ *Protect work area*
3.1.2.5	○ *Verify work arrangements*
3.1.2.6	○ *Ensure status of infrastructure*
3.1.2.7	○ *Formal agreement for control of the line*
3.1.2.8	○ *Coordinating failure and incident response*
3.1.2.9	○ *Anticipate delay*
3.1.2.10	○ *Re-planning train service*
3.1.2.11	○ *Ensure passenger and personnel safety*
3.1.2.12	○ *Rectifying the incident*
3.1.2.13	○ *Protect evidence*
3.1.3	• *To maintain, repair and extend the infrastructure*
3.1.3.1	○ *Identify engineering work requirements*
3.1.3.2	○ *Establish network access*
3.1.3.3	○ *Formulate work plans*
3.1.3.4	○ *Allocate resources*
3.1.3.5	○ *Formal agreement for control of the line*
3.1.3.6	○ *Verify work arrangements*
3.1.3.7	○ *Protect work area*
3.1.3.8	○ *Supply of resources to site work*
3.1.3.9	○ *Establish safe working environment*
3.1.3.10	○ *Using trains, plant and machinery for engineering work*
3.1.3.11	○ *Close down site on completion of work*
3.1.3.12	○ *Supervision of teams and individuals*
3.1.3.13	○ *Carrying out trackside work*
3.1.4	• *To operate a train in normal operational situations and situations where disruption or problems occur*
3.1.4.1	○ *Ensure authority*
3.1.4.2	○ *Maintain appropriate speed*
3.1.4.3	○ *Ensure train integrity and load integrity on journey*
3.1.4.4	○ *Stopping train*
3.1.4.5	○ *Management of train control systems*
3.1.4.6	○ *Ensure status of infrastructure*
3.1.4.7	○ *Operate level crossing*
3.1.4.8	○ *Warnings to other rail users*

3.1.4.9	○ *Stabling of vehicles*
3.1.4.10	○ *Provide information and support to passengers*
3.1.5	• *To control train movements in all operational circumstances*
3.1.5.1	○ *Take up control of train movement duties*
3.1.5.2	○ *Handover of responsibility*
3.1.5.3	○ *Monitor rail network*
3.1.5.4	○ *Authorise train movements*
3.1.5.5	○ *Route / re-route passenger or freight service*
3.1.5.6	○ *Record train movements*
3.1.5.7	○ *Anticipate delays or poor traffic flow*
3.1.5.8	○ *Deal with irregular train movements*
3.1.5.9	○ *Provide train identification*
3.1.5.10	○ *Manage implementation of emergency / temporary speed restrictions*
3.1.5.11	○ *Gather and communicate information*
3.1.5.12	○ *Control level crossing*
3.1.5.13	○ *Despatch train*
3.1.5.14	○ *Supervision of teams and individuals*
3.1.6	• *To prepare trains for service*
3.1.6.1	○ *Assembling vehicle formation*
3.1.6.2	○ *Preparation of vehicles*
3.1.6.3	○ *Take up driving duties*
3.1.6.4	○ *Loading of freight*
3.1.7	• *Support passenger movements and well-being at stations*
3.1.7.1	○ *Preparing stations for use by passengers*
3.1.7.2	○ *Assisting passengers*
3.1.7.3	○ *Control of crowds*
3.1.8	• *To check, inspect maintain and repair rolling stock for service*
3.1.8.1	○ *Identify rolling stock maintenance requirements*
3.1.8.2	○ *Allocate resources*
3.1.8.3	○ *Prepare rolling stock for inspection*
3.1.8.4	○ *Inspect rolling stock*
3.1.8.5	○ *Handover of responsibility*
3.1.8.6	○ *Installation of components onto vehicles normally in service*
3.1.8.7	○ *Maintenance of components on vehicles normally in service*

3.1.8.8	○ *Servicing of rolling stock*
3.2	• ***Human and organisational factors***[10]
3.2.1	• *Dynamic staff factors*
3.2.1.1	▪ *Expectation / Intention while acting / Decision model / Error type*
3.2.1.2	▪ *Vigilance/ concentration*
3.2.1.3	▪ *Fatigue*
3.2.1.4	▪ *Stress (incl. emotions & psychosocial factors)*
3.2.1.5	▪ *Situational awareness (incl. self awareness - situational self knowledge)*
3.2.2	• *Dynamic tasks factors*
3.2.2.1	▪ *Uncertainty-Volatility / Time pressure / Time to respond*
3.2.2.2	▪ *Complexity-Ambiguity / Autonomy*
3.2.2.3	▪ *Shift pattern (working hours, breaks, manning)*
3.2.2.4	▪ *Working environment (visibility, noise, vibrations, weather,…)*
3.2.3	• *Static Staff Factors*
3.2.3.1	▪ *Familiarity / Individual experiences - job history*
3.2.3.2	▪ *Individual characteristics (incl. self trust, openess (and others aspects of personality,...))*
3.2.3.3	▪ *Motivation / Commitment (to goal (priorities, risks), to organisation, to rules)*
3.2.3.4	▪ *Fit to work (matching to the requirements of the tasks/activities, health)*
3.2.3.5	▪ *Decision making skills*
3.2.4	• *Static Task Factors*
3.2.4.1	▪ *Technical Communication Means*
3.2.4.2	▪ *Task instructions - Quality of procedures and rules*

[10] Human and organisational factors aim to identify possible sources of variability that can be considered as part of the causes of an occurrence and which can be considered at all levels of the operational and management processes. This approach is inspired by the research study from Kyriakidis M., on Understanding human performance in sociotechnical systems – Steps towards a generic framework. Safety Sci. (2017), http://dx.doi.org/10.1016/j.ssci.2017.07.008
The approach introduced in the above mentioned study has been adapted to the COR taxonomy needs and taking into account the others parts of the taxonomy (e.g. the section 4 covers the Safety Management System). The need to cover further the "growing conditions" of a safety culture as well as the interactional elements related to it has also lead to additional elements compared to the approach taken as reference.
The terms used here are not further defined in this paper as they are mainly based on standard words and concept. Some explanations are also provided in the article about the research mentioned above. However, if the need for further definition appears necessary, more work can be carried out at a later stage to provide more details.

3.2.4.3	▪ *User-centered design / Human Machine Interfaces / Levels of automation*
3.2.4.4	▪ *Preventive dispositions and devices*
3.2.4.5	▪ *Societal & Institutional ontext (regulation, economy, politics, medias, trespassing, sabotage, terrorism…)*
3.2.5	• *Interactional Factors*
3.2.5.1	▪ *Communication (between employees, within organisation)*
3.2.5.2	▪ *Relations (within team, with teamleader, within organisation) - power issues*
3.2.5.3	▪ *Trust in information - in others (management, colleagues, technical means,…)*
3.2.5.4	▪ *Positive - negative reinforcement*
3.2.5.5	▪ *Involvement in decision making*
4.	**Safety Management System**[11]
4.1	• *Leadership*
4.1.1	○ *Leadership and commitment*
4.1.2	○ *Safety Policy*
4.1.3	○ *Organisational roles, responsibilities, accountabilities and authorities*
4.1.4	○ *Consultation of staff and other parties*
4.2	• *Planning*
4.2.1	○ *Actions to address risks*
4.2.2	○ *Safety objectives and planning*
4.3	• *Support*
4.3.1	○ *Resources*
4.3.2	○ *Competence*
4.3.3	○ *Awareness*
4.3.4	○ *Information and communication*
4.3.5	○ *Documented information*
4.3.6	○ *Integration of human and organisational factors*
4.4	• *Operation*
4.4.1	○ *Operational planning and control*
4.4.2	○ *Asset Management*
4.4.3	○ *Contractors, partners and suppliers*
4.4.4	○ *Management of change*

[11] Following the Commission Delegated Regulation establishing common safety methods on safety management system requirements

4.4.5	○ *Emergency management*
4.5	• *Performance evaluation*
4.5.1	○ *Monitoring*
4.5.2	○ *Internal auditing*
4.5.3	○ *Management review*
4.6	• *Improvement*
4.6.1	○ *Learning from accidents and incidents*
4.6.2	○ *Continual improvement*
5.	**Regulatory Framework**
6.	**Security**
6.1	• *Terrorism*
6.2	• *Assault*
6.3	• *Theft*
6.4	• *Arson*
6.5	• *Vandalism*
6.6	• *Cyber attack*
6.7	• *Other (security causes)*
7.	**Other causes**
7.1	• *Design of vehicle*
7.2	• *Design of fixed infrastructure*
7.3	• *Other*

Annex III – Definitions

Definitions from reportable occurrences

‘accident’ means an unwanted or unintended sudden event or a specific chain of such events which have harmful consequences; accidents are divided into the following categories: collisions; derailments; level crossing accidents; accidents to persons involving rolling stock in motion; fires and others;

‘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;

'Electrocution' - Pathological consequences caused in a human body by the passage of an electric current; or 'Electrocution' - The injury or killing of someone by a sudden discharge of electricity through a part of the body.

‘incident’ means any occurrence, other than an accident or serious accident, affecting the safety of railway operations;

‘Failure’ means defect, construction non-conformities, malfunctions or any other irregularity that endangers, or has the potential to endanger, the safety of railway operations.

‘Signal Passed at Danger when passing a danger point’ means any occasion when any part of a train proceeds beyond its authorised movement and travels beyond the danger point;

‘Signal Passed at Danger without passing a danger point’ means any occasion when any part of a train proceeds beyond its authorised movement but does not travel beyond the danger point.
Unauthorised movement means to pass:
— a trackside colour light signal or semaphore at danger, or an order to STOP where a train protection system (TPS) is not operational,
— the end of a safety-related movement authority provided in a TPS,
— a point communicated by verbal or written authorisation laid down in regulations,
— stop boards (buffer stops are not included) or hand signals.
Any case in which a vehicle without any traction unit attached or a train that is unattended runs away past a signal at danger is not included. Any case in which, for any reason, the signal is not turned to danger in time to allow the driver to stop the train before the signal is not included.

‘Broken wheel on rolling stock in service’ - A break affecting the wheel and creating a risk of accident.

‘Broken axle on rolling stock in service’ - A break affecting the axle and creating a risk of accident.

‘Wrong side signalling (vehicle) failure’ means any technical failure of a signalling system to rolling stock, resulting in signalling information less restrictive than that demanded;

‘Broken rail’ - Any rail which is separated in two or more pieces, or any rail from which a piece of metal becomes detached, causing a gap of more than 50 mm in length and more than 10 mm in depth on the running surface.

‘Track buckle or other track misalignment’ means any fault related to the continuum and the geometry of track, requiring track to be placed out of service or immediate restriction of permitted speed;

‘Wrong side signalling (infrastructure) failure’ means any technical failure of a signalling system to infrastructure, resulting in signalling information less restrictive than that demanded;

Definitions from the taxonomy

‘serious accident’ means any train collision or derailment of trains resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other accident with the same consequences which has an obvious impact on railway safety regulation or the management of safety; ‘extensive damage’ means damage that can be immediately assessed by the investigating body to cost at least EUR 2 million in total;

‘significant accident’ means any 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, other installations or environment, or extensive disruptions to traffic, excluding accidents in workshops, warehouses and depots;

‘Significant damage to stock, track, other installations or environment’ means damage that is equivalent to EUR 150 000 or more;

‘Extensive disruptions to traffic’ means that train services on a main railway line are suspended for six hours or more;

‘train’ means 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,;

'Passenger' means any person, excluding a member of the train crew, who makes a trip by rail, including a passenger trying to embark onto or disembark from a moving train for accident statistics only;

'employee or contractor' means any person whose employment is in connection with a railway and is at work at the time of the accident, including the staff of contractors, self-employed contractors, the crew of the train and persons handling rolling stock and infrastructure installations;

'Level crossing user' means any person using a level crossing to cross the railway line by any means of transport or by foot;
'Trespasser' means any person present on railway premises where such presence is forbidden, with the exception of a level crossing user;

'other person at a platform' means any person at a railway platform who is not defined as 'passenger', 'employee or contractor', 'level crossing user', 'other person not at a platform' or 'trespasser';
'other person not at a platform' means any person not at a railway platform who is not defined as 'passenger', 'employee or contractor', 'level crossing user', 'other person at a platform' or 'trespasser';

'Death (killed person)' means any person killed immediately or dying within 30 days as a result of an accident, excluding any suicide;

'Serious injury (seriously injured person)' means any person injured who was hospitalised for more than 24 hours as a result of an accident, excluding any attempted suicide.

Occurrence 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;

'Dangerous goods' means those substances and articles the carriage of which is prohibited by RID, or authorised only under the conditions prescribed therein.

'Suicide' means an act to deliberately injure oneself resulting in death, as recorded and classified by the competent national authority;

'Attempted suicide' means an act to deliberately injure oneself resulting in serious injury.

'Cost of damage to environment' means costs that are to be met by Railway Undertakings and Infrastructure Managers, appraised on the basis of their experience, in order to restore the damaged area to its state before the railway accident.

'Cost of material damage to rolling stock or infrastructure' means the cost of providing new rolling stock or infrastructure, with the same functionalities and technical parameters as that damaged beyond repair, and the cost of restoring repairable rolling stock or infrastructure to its state before the accident, to be estimated by Railway Undertakings and Infrastructure Managers on the basis of their experience, including also costs related to the leasing of rolling stock, as a consequence of non-availability due to damaged vehicles.

'Cost of delays as a consequence of accidents' means the monetary value of delays incurred by users of rail transport (passengers and freight customers) as a consequence of accidents, calculated by the CSI model.
'Level crossing' means any level intersection between a road or passage and a railway, as recognised by the

infrastructure manager and open to public or private users. Passages between platforms within stations are excluded, as well as passages over tracks for the sole use of employees.

'Road' means, for the purpose of railway accident statistics, any public or private road, street or highway, including adjacent footpaths and bicycle lanes.

'Passage' means any route, other than a road, provided for the passage of people, animals, vehicles or machinery.

'Passive level crossing' means a level crossing without any form of warning system or protection activated when it is unsafe for the user to traverse the crossing.

'active level crossing' means a level crossing where the crossing users are protected from or warned of the approaching train by devices activated when it is unsafe for the user to traverse the crossing.
Protection by the use of physical devices includes: half or full barriers gates.
Warning by the use of fixed equipment at level crossings: visible devices: lights, audible devices: bells, horns, klaxons, etc.
Active level crossings are classified as:
(a) Manual: a level crossing where user-side protection or warning is manually activated by a railway employee.
(b) Automatic with user-side warning: a level crossing where user-side warning is activated by the approaching train.
(c) Automatic with user-side protection: a level crossing where user-side protection is activated by the approaching train. This shall include a level crossing with both user-side protection and warning.
(d) Rail-side protected: a level crossing where a signal or other train protection system permits a train to proceed once the level crossing is fully user-side protected and is free from incursion.

Annex IV – INTERESTED PARTIES

List of interested parties which may receive information on the basis of a case-by-case decision under paragraph 5.6:

1. Railway undertakings and infrastructure managers;
2. Entities in charge of maintenance;
3. Manufacturers;
4. Maintenance supplies, keepers, service providers, contracting entities, carriers, consignors, consignees, loaders, unloaders, fillers and unfillers;
5. ECM certification bodies, NoBo, DeBo, AsBo.
6. Railway training organisations;
7. Third-country organisations: governmental railway authorities and accident investigation authorities from third countries;
8. International railway organisations;
9. Research: public or private research laboratories, centres or entities; or universities engaged in railway safety research or studies.

Annex V – REQUEST FOR INFORMATION FROM THE EU COR IT TOOL

1. Name:

   Function/position:

   Company:

   Address:

   Tel.:

   E-mail:

   Date:

   Nature of business:

   Category of interested party (see Annex IV)

2. Information requested (please be as specific as possible; include the relevant date/period in which you are interested): free text
3. Reason for the request: free text
4. Explain the purpose for which the information will be used: free text
5. Date by which the information is requested:
6. The completed form should be sent, via e-mail, to: (point of contact)
7. Access to information

The point of contact is not required to supply any requested information. It may do so only if it is confident that the request is compatible with applicable rules. The requestor commits itself and its organisation to restrict the use of the information to the purpose it has described under point 4. It is also recalled that information provided on the basis of this request is made available only for the purposes of railway safety and not for other purposes such as, in particular, attributing blame or liability or for commercial purposes.

The requestor is not allowed to disclose information provided to it to anyone without the written consent of the point of contact.

Failure to comply with these conditions may lead to a refusal of access to further information from the EU COR IT Tool and, where applicable, to the imposition of penalties from the concerned Member states.

8. Date, place and signature:

Annex VI – Comment sheet

Document Review – Comment Sheet

Document commented:

Requestor:	The Agency
Deadline for submitting comments:	

	Reviewer 1	*Reviewer 2*	*Reviewer 3*	*Reviewer 4*	*Reviewer 5*
Date:					
Name:					
Organisation:					
Email:					
Do you agree on the publication of your comments on the ERA Extranet space related to COR project? (Yes/No): YES					

Document History

Version	*Date*	*Comments*
0.1		First draft for external comments

Conventions:

Type of Comment		*Reply by requestor*	
G	General	*R*	Rejected
M	Mistake	*A*	Accepted
U	Understanding	*D*	Discussion necessary
P	Proposal	*NWC*	Noted without need to change

Review Comments <if necessary add extra lines in the table>

N°	*Reference (e.g. Art, §)*	*Type*	*Reviewer*	*Reviewer's Comments, Questions, Proposals*	*Reply*	*Proposal for the correction or justification for the rejection*
1.						
2.						
3.						

Note: This table could be changed according to the requestor's needs

Appendix III

	A	B	C	D	E	F	G	H
1	1st Level	2nd Level	**Details**	**From**	**ROAD**	**RAIL**	**WATERWAYS**	**Comments**
2	**1- GENERAL INCIDENT / ACCIDENT INFORMATION – Bow-Tie 3.1 / 3.3 / 3.10**							
3			***Date***	Every report	x	x		
4			***Time***	Every report	x	x		
5			***Day of the week***	CADAS				
6			***Location of accident***	Every report	x	x		Commune,
7								Way of defining location may differ in every domain of transport or even within the same mode of transport.
8								
9			***Country***	Every report (CADAS, 1.8.5, etc..)	x	x		
10			***Ligne ferroviaire – Route - canal***	In railways	x	x		Identification ligne ferroviaire, route, To be checked the reporting regime is available?
11			***Rail Station –-***	In railways				To check redundancy
12			***Parking place***					To check coherence between place and activity
13		baseline	Kilometre marker	1.8.5 (km)	x	x		Depending on the mode of transport km marker may have different references.
14			GPS coordinates (Latitude, Longitude)	suggestion				
15			1.8.5 event : Y / N ? (to keep in mind to indicate severity)			X		Criteria should be reviewed to include some events, even if there are no DG consequences.
16			L1: lake					
17			L2: river					
18			L3: secondary structures: Watergate areas, harbors					
19	**2. Activity / Operation(Chapter 1.4 RID , ADR)/ Bow-Tie 3.1**							
20		**A) Event occurred during :**						
21			**LOADING**				X	
22			filling (bulk)	ADR/RID	X	x		
23			Loading	ADR/RID	X	x		Preparation, marking, etc.
24			**CIRCULATION/ CARRIAGE**					To be further discussed**
25			**- straight forward / normal driving-**	CADAS U11.20	x			
26			Driving road	Suggestion	X			Definition must include temporary stops/storage (as rail) parking for road transport
27			Train runnning rail	TAF TSI catalogue		X		Concept use in TAF TSI
28			**- stopping (Due to traffic lights)**	Suggestion	x			
29			**- slowing Due to traffic conditions (near the roadworks)**	CADAS U 11.06	x	X		Suggestion for rail .
30			Train Stopping rail	OPE TSI		X		Operational TSI
31			Train Stopping rail (driver left cabin)	Suggestion		X		
32			Temporary storage / Marshalling (rail)	RID		X		To be further discussed**
33			Temporary storage (road)	Suggestion	X			
34			Local Maneouvres (road)	Suggestion	X			To be further discussed**
35			**- parking (the driver has temporarily left his vehicle) –**	CADAS U 11.02	x			

	A	B	C	D	E	F	G	H
36			transhipment	ADR/RID	X	x		To be further discussed** (Intermediate Temporary Storage)
37								
38			**UNLOADING**				X	
39			unloading	ADR/RID	X	x		
40	**3 - WEATHER CONDITIONS Bow-Tie 3.6 / 3.1**							
41			**- dry, clear**	CADAS A-6.01	X	x		
42			**- rain**	CADAS A-6.02	X	x		
43			**- snow**	CADAS A-6.03	X	x		
44			**- fog, mist, smoke**	CADAS A-6.04	X	x		
45			**- sleet, hail**	CADAS A-6.05	X	x		
46			**- severe winds**	CADAS A-6.06	X	x		
47			**- other**	CADAS A-6.07	X	x		
48			**Temperature**	1.8.5.	X	x		
49				CADAS A-6.01				
50			**Thunder Storm**	1.8.5	X	X		
51			**- unknown**	CADAS A-6.99	X	x		
52	**4 – SURFACE CONDITIONS (to be investigated in Rail by UIC) Bow-Tie 3.6 / 3.1**							
53			**- dry**	CADAS R-16.01	X	X		Suggestion to be used in railways too
54			**- snow, frost, ice, slush**	CADAS R-16.02	X	X		Suggestion to be used in railways too
55			**- slippery**	CADAS R-16.03	X	X		Suggestion to be used in railways too
56			**- wet, damp**	CADAS R-16.04	X	X		Suggestion to be used in railways too
57			**- flood**	CADAS R-16.05	X	X		Suggestion to be used in railways too
58			**- other**	CADAS R-16.06	X	X		Suggestion to be used in railways too
59			**- unkown**	CADAS R-16.99	X	X		Suggestion to be used in railways too
60	**5- LIGHT CONDITIONS (to be investigated in Rail by UIC) Bow-Tie 3.6 / 3.1**							
61			**- daylight**	CADAS A-7.01	X	X		Suggestion to be used in railways too
62			**- twilight**	CADAS A-7.02	X	X		Suggestion to be used in railways too
63			**- darkness street light lit**	CADAS A-7.03	X	X		Suggestion to be used in railways too
64			***- darkness street light unlit***	CADAS A-7.04	X	X		Suggestion to be used in railways too
65			**- darkness no street lights**	CADAS A-7.05	X	X		Suggestion to be used in railways too
66			**- darkness street lights unknown**	CADAS A-7.06	X	X		Suggestion to be used in railways too
67			**- darkness no street lights or street lights unlit**	CADAS A-7.07	X	X		Suggestion to be used in railways too
68			**- unknown**	CADAS A-7.99	X	X		Suggestion to be used in railways too
69	**6- INFRASTRUCTURE Bow-Tie 3.1 / 3.6 (Definition: all routes and fixed installations of the three modes of transport ¨(rail, road, inland waterways) being routes and installations necessary for the circulation and safety of traffic. EU Regulation (EEC) No 1108/70)**							
70			- built-up area	1.8.5	X	x		**To be moved to another section
71								
72			- open road –	1.8.5	X			**To be moved to another section

	A	B	C	D	E	F	G	H
73			- Line category (track category)	INF TSI		X		**To find appropiate reference register , UIC and ERA**
74			facilities	suggestion	X	x		On site / Off site customer sidings
75			marshalling yards	Chapter 1.11		X		
76			multimodal platform	suggestion	x	x		It corresponds to Intermadiate Temporary Storage – Section 2
77			Single track			X		**To find appropiate reference register , UIC and ERA**
78			Multiple Track (more than 1)			X		**To find appropiate reference register , UIC and ERA**
79		**- dual carriageway (median made of):**		CADAS R-18.03	x			Is it covered by CADAS? To check whether there is a defined data in CADAS.
80			***** steel safety barriers / concrete barriers	suggestion	x			Is it covered by CADAS? To check whether there is a defined data in CADAS.
81			***** grassy strip / road markings	suggestion	x			Is it covered by CADAS? To check whether there is a defined data in CADAS.
82			• Trench	suggestion	X			Is it covered by CADAS? To check whether there is a defined data in CADAS.
83		**- two way street**		CADAS R-18.02	x			
84		**- one way street**		CADAS R-18.01	x			
85		**- single carriageway**		CADAS R-18.04	x			
86		**- unpaved-road**		UNECE B.I-03	x			
87			Electrified			X		**To find appropiate reference register , UIC and ERA**
88			Type of signalling			X		**To find appropiate reference register , UIC and ERA**
89		**C9: Infrastructure deficiency**					X	
90	**7- TOPOGRAPHY Bow-Tie 3.6/3.1**							
91		**CIRCULATION/ CARRIAGE**						
92			**- straight road**	CADAS A-10.06	x	x		idea from
93			**- road/rail curve** (in a)	CADAS R-25.01	x	x		
94			**- entrance / exit ramps**	CADAS R-14.04	x	(x)		
95			- S-curve road	suggestion	x			To be checked the wording
96		Minimum radius of curvature		OPE TSI		X		
97			- level crossing	suggestion	x	X		
98			- gradient / incline :	1.8.5	x	(x)		
99			* descending	suggestion	x	x		
100			* ascending	suggestion	x	(x)		
101			**- roundabout**	CADAS R-13.02	x			
102			- tunnel (inside the)	1.8.5	x	X		
103			- entrance / exit of the tunnel	suggestion	x			Outside the tunnel
104			- bridge *(on a)*	1.8.5	x	x		

	A	B	C	D	E	F	G	H
105			- under the bridge	suggestion	x	x		
106			- underpass	1.8.5	X	x		
107			- crossing / intersection	1.8.5	X	x		
108		Rail station		suggestion		X		
109		Track gauge		OPE TSI and INF TSI		X		
110			Separation Tracks	OPE TSI nas LOC&PAS TSI		X		
111			Height OCL (Overhead Contact Line)	LOC&PAS TSI		X		
112		**LOADING/UNLOADING**					X	
113			Paved surface	SULID Document (Identification of loading and unloading sites by CEFIC)	X	X		For loading and unloading operations
114			Concrete surface	SULID Document (Identification of loading and unloading sites by CEFIC)	X	X		For loading and unloading operations
115			Unpaved Surface	SULID Document (Identification of loading and unloading sites by CEFIC)	X	X		For loading and unloading operations
116	**8- VEHICLE INFORMATION/DESCRIPTION Bow-Tie 3.1 – Information Vehicle Related (because packages in 1 vehicle)**							
117			Total number of vehicles involved in the accident	Suggestion	X	X		Not linked to train composition TAF/TSI
118			Register Number	NVR and TAF TSI		X		From NVR
119			Train Composition	TAF TSI		X		
120			Position of the vehicle(s) in the train	TAF TSI		X		To be drawn from TAF TSI – Train Composition message
121			Of those, total number of DG transport unit(s)	TAF TSI	X	x		To be drawn from TAF TSI – Train Composition message
122			Isolated Wagon (	TAF TSI		X		To be drawn from TAF TSI (Need further Clarification of the meaning of “isolated”)
123			Locomotive Register Number	NVR and ERATV		X		NVR and ERATV
124		■ DGV shape :						
125			**- vehicle without trailer or semi-trailer**	CADAS U-4.01	X			
126			**- vehicle with trailer or semi-trailer**	CADAS U-4.02	X			
127			**- light DGV**	UNECE B.II.A-22	X			Vans or, gross vehicle weight ≤ 3.5 ton
128			**- road train**	UNECE B.II.A-33	X			To check definition (need definitive further explanation & clarifications)
129			- others		X			
130								
131			Wagon	NVR		X		NVR (National Vehicle Register) – Should not be better to refer to Wagon TSI)?
132			Tank-wagon	NVR		X		NVR (National Vehicle Register) – Should not be better to refer to Wagon TSI)?

	A	B	C	D	E	F	G	H
133			Wagon with demountable tank	NVR		X		NVR (National Vehicle Register) – Should not be better to refer to Wagon TSI)?
134			Other types of wagon	NVR		X		NVR (National Vehicle Register) – Should not be better to refer to Wagon TSI)?
135	**9 -MEANS OF CONTAINEMENT INFORMATION Bow-Tie 3.1 – Information Vehicle Related (because packages in 1 vehicle)**							
136		■ Type of body of DGV (UNECE – B.II.A-24)						Classification due to their superstructures
137			**DGV ordinary open box** :	UNECE B.II.A-24	X	x		Specefic Defintion for rail
138			- flat		X	x		Specefic Defintion for rail
139			- with cover		X	x		Specefic Defintion for rail
140			**Tipper /** dump truck	UNECE B.II.A-24	X	x		Specefic Defintion for rail
141			**Tanker** (road) :	UNECE B.II.A-24	X	x		Specefic Defintion for rail
142			- solid bulk		X	x		Specefic Defintion for rail
143			- liquid bulk		X	x		Specefic Defintion for rail
144			Others		X	x		Specefic Defintion for rail
145			- packaging	1.8.5	X	x		
146			- IBC	1.8.5	X	x		To be included with drop list and codes.
147			- large packaging	1.8.5	X	x		
148			- small container	1.8.5	X	x		
149			- vehicle	1.8.5	X	x		For bulk carriage? (If suggestion of BK1 and BK2 is adopted, then vehicle may be deleted).
150			- tank-vehicle	1.8.5	X	x		
151			- battery-vehicle	1.8.5	X	x		
152			- demountable tank	1.8.5	X	x		
153			- large container	1.8.5	X	x		
154			- tank-container	1.8.5	X	x		
155			- MGEC	1.8.5	X	x		
156			- portable tank	1.8.5	X	x		
157			**- dry bulk container** [7.3.1.1 (a)]	UNECE B.II.B-06	X	x		
158			- code BK1	UNECE B.II.B-06	X	x		carriage in sheeted bulk containers
159			- code BK2	UNECE B.II.B-06	X	x		carriage in closed bulk containers
160			**- dry bulk container** [7.3.1.1 (b)]		X	x		
161			- code VC1	UNECE B.II.B-06	X	x		carriage in sheeted vehicles, sheeted containers or, sheeted bulk containers
162			- code VC2	UNECE B.II.B-06	X	x		carriage in closed vehicles, closed containers or, closed bulk containers
163			- code VC3	UNECE B.II.B-06	X	x		Carriage in specially equipped vehicles or containers
164								
165		■ **Temperature controlled box** (tank / container)		UNECE B.II.A-24	X	x		Not mentioned in 1.8.5
166			■ Means of containment material	1.8.5	X	x		For packaging may be covered by code 1.8.5?
167			Tank code	RID-ADR	X	X		

	A	B	C	D	E	F	G	H
168			Packaging marking (if applicable)	RID-ADR	x	x		This shall include only technical information and skip nominative identification of approval body. As the marking gives codified information on the packaging type, the above mentions may not be necessary.
169	**10- DANGEROUS GOODS TRANSPORTED Bow-Tie 3.1 / 3.2 – Information Vehicle Related (because packages in 1 vehicle)**							
170			***UN number***	1.8.5 ~~and TAF TSI~~	x	X		TAF TSI : information available for Rail only
171			***Name of the DG***	1.8.5 ~~and TAF TSI~~	x	X		TAF TSI : information available for Rail only
172			***Class***	1.8.5 ~~and TAF TSI~~	x	X		TAF TSI : information available for Rail only
173			***Packaging group***	1.8.5 ~~and TAF TSI~~	x	X		TAF TSI : information available for Rail only
174			***Tunnel Code***	ADR	X			
175			Total quantity of DG carried (estimated) per UN Number	~~TAF TSI (rail)~~	X	X		Reference RID-ADR still to be mentioned
176				~~Transport document~~				
177			Particlar arrangements	suggestion	X	X		To consider particular transport for nuclear or military purpose
178	**11- DESCRIPTION OF THE OCCURRENCE Bow-Tie 3.5 / 3.6**							
179		► leaving the road/derailment ~~rail~~		1.8.5	x	x		
180			rolling over	1.8.5	x			
181			- left side	suggestion	x			
182			- right side	suggestion	x			
183		► lane departure / wrong line in rail)		suggestion	x	X		
184		► jack-knifing		suggestion	x	X		To be clarified by UIC for rail (bvoie)
185		► drop from a height (vehicle)		suggestion	x	X		
186		► package drop		suggestion	x	X		
187		► ***Collision*** :		1.8.5	x	x	X	To make an estimation of the energy of the impact per vehicle
188			* speed (DGV)	suggestion	x	x		
189			* vehicle gross weight (kg)/ train	suggestion	x	x		
190								
191			Crash type (from the DGV) :					
192			**- head-on collision : Collision**		x	x		
193			**- left front**	CADAS U-12.02	x			
194			**- centre front**	CADAS U-12.03	x			
195			**- right front**	CADAS U-12.04	x			
196			**- side-impact collision – Prise en écharpe**		x	x		
197			**- right side -**	CADAS U-12.05	X			
198			**- left side -**	CADAS U-12.09	X			
199			**- rear-end collision – rattrapage**		X	x		
200			**- right rear-**	CADAS U-12.06	X			
201			**- centre rear –**	CADAS U-12.07	x			
202			**- left rear –**	CADAS U-12.08	X			
203			-					*Redundant with chapter 2 here above*
204			Collision against **fixed** obstacle (s) :		X	x		
205			**- parked HGV :**	CADAS U-14.10	x			CADAS U 11.02
206			- with trailer / semi-trailer	Suggestion	x			
207			- without trailer / semi-trailer	Suggestion	x			
208			**- parked DGV :**	CADAS U-14.10	X	x		
209			- with trailer / semi-trailer	Suggestion	x			
210			- without trailer / semi-trailer	Suggestion	x			
211			**- parked bus**	Suggestion	x			

	A	B	C	D	E	F	G	H
212			**- parked light goods road vehicle**	UNECE B-II.A-22	x			
213			**- parked passenger road vehicle**	UNECE B-II.A-07	x			
214			**- bridge pillars**	CADAS U-13.04	x	x		
215			**- safety / concrete barrier**	CADAS U-14.07/08	X	X		
216			**- stone / rock / mountain side**	CADAS U-14.11	X	X		
217			**- other permanent object**	CADAS U-14.14	X	X		
218			- élément de l'infrastructure engageant le gabarit	Suggestion		x		
219			- heurtoir (enfoncement)	Suggestion		x		
220			- obstacle sur la voie (hors passage à niveau)	Suggestion		x		
221			Trench	Suggestion	X			
222			**- submerged in water**	Suggestion	X	X		
223								
224			**Tree**	Suggestion	X	X		
225			Collision against **moving** obstacle (s) :		X	x		
226			- HGV :					
227			- without trailer / semi-trailer					
228			- with trailer / semi-trailer					
229			- another DGV /or DG Train		x	x		
230			- without trailer / semi-trailer					
231			- with trailer / semi-trailer					
232			**- train/road vehicle**	CADAS U-13.10	X	x		
233			**- bus** (motor coach, trolley bus, tram, ..)	UNECE B-II.A-15	X	x		
234			- passenger road vehicle		X	x		
235			**- agricultural tractor**	UNECE B-II.A-28	X	x		
236			- others (motorcycle, bicycle, pedestrian, animal, ..)		X	x		
237			Track Maintenance Machines			X		
238			E7.1: vessel with person				X	
239			E7.2: vessel with vessel				X	
240			E7.3: vessel with bridges, in watergate or harbor area or with objects in water				X	
241		► ***Loss*** (location of the leakage for all packaging) :		**Bow-Tie 3.5/ 3.7**			x	To be clarified: is it a cause or a consequence? Need for a new chapter elated to the Bow-Tie § 3.7. Follow-up DG events
242			Valves not accessible after overturning	Suggestion	X	X		
243			**- body**	US DOT-104	X	X		
244			**- bottom outlet valve**	US DOT-106	X	X		
245			**- closure (cap, top, or plug)**	US DOT-109	X	X		
246			**- cover**	US DOT-110	X	X		
247			**- cylinder neck or shoulder**	US DOT-111	X	X		
248			**- cylinder sidewall – near base**	US DOT-112	X	X		
249			**- cylinder sidewall - other**	US DOT-113	X	X		
250			**- cylinder valve**	US DOT-114	X	X		
251			**- flange**	US DOT-118	X	X		
252			**- gauging device**	US DOT-122	X	X		
253			**- hose**	US DOT-125	X	X		
254			**- hose adaptor or coupling**	US DOT-126	X	X		
255			**- inlet (loading) valve**	US DOT-127	X	X		
256			**- inner packaging**	US DOT-128	X	X		

	A	B	C	D	E	F	G	H
257			**- inner receptacle**	US DOT-129	X	X		
258			**- loading / unloading lines**	US DOT-135	X	X		
259			**- manhole or dome cover**	US DOT-137	X	X		
260			**- piping or fittings**	US DOT-141	X	X		
261			**- pressure relief valve**	US DOT-143	X	X		
262			**- sample line**	US DOT-146	X	X		
263			**- tank head**	US DOT-149	X	X		
264			**- tank shell**	US DOT-150	X	X		
265			- vacuity visualization window (valve adapter)	suggestion	X	X		
266			**- vacuum relief valve**	US DOT-153	X	X		
267			**- vent**	US DOT-159	X	X		
268			**- weld or seam**	US DOT-161	X	X		
269			suspicious smell	Suggestion	X	X		
270			- other	Suggestion	X	X		
271			Bursting disk	Suggestion				
272		► Packaging						
273			- burst or ruptured	US DOT-303	X	X		
274			- cracked	US DOT-304	X	X		
275			- crushed	US DOT-305	X	X		
276		► vapour cloud			x	x		
277			**Discontinuty in the Rail Infrastructure**	Suggestion		X		It is a principle in Rail signalling
278		► ***Fire*** (location) :		**Bow-Tie 3.7 / 3.8**	**x**	**x**	X	In line with OPE TSI , section 4.2.3.7.
279			- tractor cab	suggestion	x			
280			**- road tractor**	UNECE B-II.A-27	x			
281			- tyres / trailer axle	suggestion	x			
282			- tank-trailer	suggestion	x			
283			**- trailer / semi-trailer**	UNECE B-II.A-29/31	x			
284			- wagon/transport unit	suggestion	x	x		the whole transport unit, including its load, was destroyed by fire.
285		► ***Explosion***		**Bow-Tie 3.7 / 3.8**			X	
286			* explosion **without** fire :					
287			- over-pressurized inside the tank / packaging	US DOT-530	X	X		
288			- other	Suggestion	X	X		
289								
290			* explosion **with** fire (concerned item) :					
291			- tank	Suggestion	X	X		
292			- pressure receptacle	Suggestion	X	X		
293			- other packaging	Suggestion	X	X		

	A	B	C	D	E	F	G	H
294		► ***imminent risk of loss of product*** (structural damage, no suitable for further carriage, ..)		Bow-Tie 3.7	X	X		To be clarified: is it a cause or a consequence? Need for a new chapter elated to the Bow-Tie § 3.7. Follow-up DG events
295			**- bent**	US DOT-302	X	X		
296			**- failed to operate**	US DOT-306	X	X		
297			**- gouged or cut**	US DOT-307	X	X		
298			**- ripped or torn**	US DOT-310	X	X		
299			**- torn off or damaged**	US DOT-312	X	X		
300			**- vented**	US DOT-313	X	X		
301		E8: Sinking					X	
302		E9: Stranding					X	
303		E10: Overturning/capsizing					X	
304	**12- CAUSE OF OCCURRENCE (related to a 1st assessment, if feasible) Bow-Tie 3.5 / 3.6**							
305		► ***Technical fault***						
306			- electrical system failure	Suggestion	X			
307			- mechanical system failure	Suggestion	X			
308			**- broken component or device**	US DOT-502	X			
309			**- defective component or device**	US DOT-508	X			
310			**- missing component or device**	US DOT-528	X		X	
311			- tyre	Suggestion	X			
312			- brake system failure	Suggestion	X			
313			**- abrasion**	US DOT-501	X	X		
314			- corrosion					
315			**- exterior**	US DOT-506	X	X		
316			**- interior**	US DOT-507	X	X		
317			**Damaged Lining**	Suggestion	X	X		
318			- poor conditions of the packaging	suggestion	X	X		
319			- defective measuring instruments	suggestion	X	X		
320			- other		X	X		
321		► tyre blow-out		suggestion	x			
322		► tyre puncture		suggestion	x			
323		► breakage of the connection fitting between tractor/trailer		suggestion	x			
324		► *related to procedures*						
325			**- improper preparation for transportation**	US DOT-517	X	X		
326								
327			**- inadequate maintenance**	US DOT-520	X	X		
328								
329			**- inadequate preparation for transportation**	US DOT-521	X	X		
330								
331			**- inadequate procedures**	US DOT-522	X	X		
332								
333			**- overfilled**	US DOT-529	X	X		
334								
335			**- over-pressurized**	US DOT-530	X	X		
336								
337			**- valve open**	US DOT-535	X	X		
338								
339		► ***Faulty load securing***		1.8.5	X	X		
340			- improper securing arrangement	suggestion	X	X		
341			**- inadequate blocking and bracing**	US DOT-519	X	X		
342								
343		► ***related to DG carried*** (spontaneous chemical reaction / combustion)						
344			**- incompatible products**	US DOT-524	X	X		
345			- incompatible material of the containment (packaging or tank) with the product carried	suggestion	X	X		
346			**- self-ignition**	US DOT-503	X	X		

	A	B	C	D	E	F	G	H
347			**- polymerization**	US DOT-504	X	X		
348								
349		► Human cause					X	
350			- effect of alcohol	Suggestion	X	X		
351			- effect of narcotics	Suggestion	X	X		
352			- medical treatment / unwell feeling	Suggestion			x	
353			- excessive speed	Suggestion	X	X		
354			- lack of experience	Suggestion	X	X		
355			- inattention	Suggestion	X	X		
356			- sleepiness	Suggestion	X	X		
357			- careless driving	Suggestion	X	X		
358			- loss of control over the DGV (despite the observation of speed limits)	Suggestion	X	X		
359			- loss of control over the DGV (non-specified)	Suggestion	X	X		
360			- non-compliance with the procedures	Suggestion	X	X		
361			**- inadequate training**	US DOT-523	X	X		
362			- other					
363		► External cause						
364			- slippery / wet road	Suggestion	X			
365			- weather conditions	Suggestion	X			
366			- narrow road	Suggestion	X			
367			- other	Suggestion	X			
368		► Other vehicle		Suggestion	X	X		
369		► liquid movement inside the tank		suggestion	X	X		
370		► Other cause (theft, sabotage, ..)		Suggestion	X	X		
371	**13 – Categories of causes RAIL**							
372		► ***Infrastructue (Cause level 1)***						
373			track failure (broken rail, ...)	UIC		X		
374			Disorder engineering structure (railway bridge, viaduct, retaining wall ...)	UIC		X		
375			Disorder earthwork (embankment, trenches, ...)	UIC	X	X		
376			fixed installation fire	UIC		X		
377			an open level crossing	UIC	X	X		
378			track failure (broken rail, ...)	UIC		X		
379		► ***Control and Command (Cause level 1)***						
380			Failure of the operation of the signaling	UIC		X		
381			Failure Presence control circulations (deshunting, axle counters, ...)	UIC		X		
382		► ***Rolling Stock (not in RID - Cause level 1)***						
383			**Damage to a critical organ (Cause level 2)**	UIC				
384			hot box	UIC		X		
385			Out axle	UIC		X		
386			Breaking wheel	UIC	X	X		
387			Out of suspension elements	UIC		X		
388			Breakaway	UIC		X		
389		►***Explotation – Traffic Management (Trains Circulation - Cause level 1)***						
390			**Traffic Management (Cause level 2)**	UIC				
391			untimely Reception on occupied track	UIC		X		
392			Authorised passing signal without verification	UIC		X		
393			Shipping traffic without a planned order	UIC		X		
394			untimely exit from a closed area	UIC		X		
395			Conversely inadvertent movement of the normal direction	UIC		X		
396			irregular penetration in the occupied zone	UIC		X		
397			inadvertent engagement on a secure channel (eg work)	UIC		X		
398			Fault protection measures	UIC		X		
399			Non-compliance with the terms of the movement authority (eg exceptional transport)	UIC		X		
400			Derivative	UIC		X		
401			immobilizer fault	UIC		X		
402			Tailgating needle or two-way	UIC		X		
403			**Train Composition (Cause level 2)**	UIC				
404			Traffic unauthorized vehicle	UIC		X		
405			Anomaly or load fault	UIC		X		
406			Anomaly on train composition	UIC		X		
407			**Train Driving (Cause level 2)**	UIC				
408			Passing a breakpoint	UIC		X		

	A	B	C	D	E	F	G	H
409			speed-limit is exceeded	UIC	X	X		
410			Failure to comply with the restrictive Marche	UIC		X		
411			Stop omission	UIC	X	X		
412			Tunnel Code	ADR	X			
413			***Temporary stays - Operation - Manoeuvres (Cause level 1)***					
414			maneuver operations	UIC	X	X		
415			Gravity sorting	UIC		X		
416		***Reason for a delay or interruption. Cause and Code based UIC Leaflet 450-2, Appendix C used in TAF TSI. The first digit in the code has to following meaning:***					X	
417			1 Operational planning, Management (IM)	TAF TSI		X		
418			2 Infrastructure installations (IM)	TAF TSI		X		
419			4 Causes of other IM (IM)	TAF TSI		X		
420			5 Commercial causes (RU)	TAF TSI		X		
421			6 Rolling stock (RU)	TAF TSI		X		
422			7 Causes of other RU (RU)	TAF TSI		X		
423			8 External causes	TAF TSI	X	X		
424			9 Secondary causes	TAF TSI	X	X		
425			23 Power supply equipment	TAF TSI	X	X		
426			91 Track occupation caused by the lateness of the same train	TAF TSI		X		
427			92 Track occupation caused by the lateness of another train	TAF TSI		X		
428			94 Connection	TAF TSI	X	X		
429	**C: Description of the causes (inland waterways)**							
430	C1: Technical fault vessel							
431	C2: Natural phenomena, force majeure							
432	C3: Sabotage / vandalism							
433	C4: Precedent incident of third party							
434	C5: Spurious action	C5.1: against rules/regulations						
435		C5.2: during boarding/disembarking						
436		C5.3: during operation of facilities and equipment						
437		C5.4: during mooring of vessel						
438		C5.5: during information transfer						
439		C5.6: drugs and alcohol						
440		C5.7: others						
441	C10: Other causes							
442	**14- CONSEQUENCES OF OCCURRENCE Bow-Tie 3.8 / 3.10**						X	
443		► Total number of personal injury :						
444			* number of deaths	1.8.5	X	X		
445			* number of injured people	1.8.5	X	X		
446								
447		► Of those, number of personal injury in connection with DG:						
448			* number of deaths	Suggestion	X	X		
449			* number of injured people	Suggestion	X	X		
450			Driver killed/ injured	Statistisches Bundesamt, Wiesbaden 2014: Unfälle von Güterkraftfahrzeugen im Straßenverkehr (incl. Zeitreihen), 2013	X			
451		***Material / Environment damage***						
452			Estimated quantity of loss of products (kg or l)	1.8.5	X	X		Bow-Tie 3.8 / 3.10
453			Estimated level of damage ≤ 50,000 Euros	1.8.5	X	X		Bow-Tie 3.8 / 3.10
454			Estimated level of damage ≥ 50,000 Euros	1.8.5	X	X		Bow-Tie 3.8 / 3.10
455			Air pollution (Yes [type]/No)	Spanish Civil Protection	X	X	X	Bow-Tie 3.8 / 3.11
456			Water pollution (Yes [type]/No)	Spanish Civil Protection	X	X	X	Bow-Tie 3.8 / 3.12
457			Soil pollution (Yes [type]/No)	Spanish Civil Protection	X	X	X	Bow-Tie 3.8 / 3.13

	A	B	C	D	E	F	G	H
458		***Involvement of authorities***						
459			No	1.8.5	X	X	X	
460			Yes	1.8.5	X	X	X	
461			Evacuation of persons for a duration of at least 3 hours …	1.8.5	X	X	X	
462			Closure of public traffic routes for a duration of at last 3 hours…	1.8.5	X	X	X	
463		► (consequences from the central event leading to following events and different type of impacts)		**Bow-Tie ?**				
464			**infrastructure impact (Level 2 – indirect impact)**	UIC		X		
465			Delays, disruption and / or deviation (Level 3 – follow-up impact)			X		
466			**Impacts Rolling Stock (Level 2 – indirect impact)**	UIC		X		
467			operating losses (Level 3 – follow-up impact)			X		
468			**Vehicle (Level 2 – indirect impact)**	UIC		X		
469		***Type of Death***						
470			**Traumatic (number)**	Spanish Civil Protection	x	X	x	**Bow-Tie 3.8 / 3.13**
471			**Intoxicated (number)** **Burn (number)**	Spanish Civil Protection	x	X	x	**Bow-Tie 3.8 / 3.13**
472			**Radiation (number)**	Spanish Civil Protection	x	X	x	**Bow-Tie 3.8 / 3.14**
473		***Type of Injured***	**–Traumatic (number)**	Spanish Civil Protection	x	X	x	**Bow-Tie 3.8 / 3.15**
474			**Intoxicated (number)**	Spanish Civil Protection	x	X	x	**Bow-Tie 3.8 / 3.16**
475			**Burn (number)**	Spanish Civil Protection	x	X	x	**Bow-Tie 3.8 / 3.17**
476			**Radiation (number)**	Spanish Civil Protection	x	X	x	**Bow-Tie 3.8 / 3.18**
477								
478	**E: Description of event (inland waterways)**							
479	E1: Accidents with persons involved	3.10 Impacts						
480	E2: Occupational accident	Loading/ Unloading						
481	E3: Fire							
482	E4: Explosion							
483	E5: Disturbance							
484	E6: Various events	1.8.5 event : Y / N ? (to keep in mind to indicate severity)						
485	E7: Collision							
486		E7.1: vessel with person						
487		E7.2: vessel with vessel						
488		E7.3: vessel with bridges, in watergate or harbor area or with objects in water						
489	E8: Sinking							
490	E9: Stranding							
491	E10: Overturning/capsizing							
492	E11: Leakage							
493	**L: Description of the location (inland waterways)**							
494	L1: lake							
495	L2: river							
496	L3: secondary structures: Watergate areas, harbors							
497	**C: Description of the causes (inland waterways)**							
498	C1: Technical fault vessel							
499	C2: Natural phenomena, force majeure							
500	C3: Sabotage / vandalism							
501	C4: Precedent incident of third party							
502	C5: Spurious action	C5.1: against rules/regulations						
503		C5.2: during boarding/disembarking						
504		C5.3: during operation of facilities and equipment						

	A	B	C	D	E	F	G	H
505		C5.4: during mooring of vessel						
506		C5.5: during information transfer						
507		C5.6: drugs and alcohol						
508		C5.7: others						
509								
510	C7: Medical problems							
511	C8: Missing equipment							
512	C9: Infrastructure deficiency							
513	C10: Other causes							
514	**I: Description of the consequences (inland waterways)**							
515	**R: Description of origin or of the res**	Further explanation is needed to assign this definition						
516	R1: Technics	Further explanation is needed to assign this definition						
517	R2: Nature	Further explanation is needed to assign this definition						
518	R3: Ship's crew	Further explanation is needed to assign this definition						
519	R4: Other employees	Further explanation is needed to assign this definition						
520	R3: Passengers	Further explanation is needed to assign this definition						
521	R4: Third parties	Further explanation is needed to assign this definition						
522	R5: Trespassers	Further explanation is needed to assign this definition						