ORGANISATION INTERGOUVERNEMENTALE POUR LES TRANSPORTS INTERNATIONAUX FERROVIAIRES
ZWISCHENSTAATLICHE ORGANISATION FÜR DEN INTERNATIONALEN EISENBAHNVERKEHR
INTERGOVERNMENTAL ORGANISATION FOR INTERNATIONAL CARRIAGE BY RAIL

[OTIF/RID/CE/GTDD/2014-A]

13 November 2014

Original: German

To delegates who took part in the

1st session of the RID Committee of Experts' working group on derailment detection

(Rome, 13 – 15 October 2014)

Report (2nd draft)

Note by the OTIF Secretariat:

The working group decided that the report of the 1st session of the working group on derailment detection should only include a brief summary of the presentations and not a detailed report of the discussions. After the first draft of the report was sent out, the Secretariat received numerous comments. The Secretariat does not therefore feel in a position to publish a final version of this report and will submit this second draft to the 2nd session of the working group on derailment detection (Bern, 24 to 26 February 2015) for approval. This 2nd draft shows the amendments compared with the 1st draft.

1. At the invitation of the Italian Ministry of Transport, the 1st session of the RID Committee of Experts' working group on derailment detection was held from 13 to 15 October 2014 in Rome.

2. The following States took part in the discussions at this session: Belgium, Bosnia-Herzegovina, Finland, France, Germany, Italy, Montenegro, Netherlands, Norway, Switzerland and the United Kingdom. The European Commission and the European Railway Agency (ERA) were also represented. The European Chemical Industry Council (CEFIC), the Community of European Railway and Infrastructure Companies (CER), the International Union of Wagon Keepers (UIP) and the Association of the European Rail Industry (UNIFE) also took part in the meeting (see Annex II).

3. The Secretariat informed the meeting that following discussions between the European Commission and delegates of the RID Committee of Experts, as well as an exchange of letters between the European Commission and OTIF, the Secretariat had also sent participants of OTIF's Committee of Technical Experts the invitation to this working group.

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Chairman of the working group meeting

4. As proposed by Germany, Mr Klaas Tiemersma (Netherlands) was elected chairman of the working group.

5. The chairman summarised the previous discussions at the working group on tank and vehicle technology, the standing working group and the RID Committee of Experts itself (see also documents OTIF/RID/CE/GTDD/2014/1 and …/2014/2). He reminded the meeting of this working group's terms of reference. They covered issues relating to the functioning of mechanical derailment detectors, different types of derailment detectors and other measures to mitigate the effects of derailments, but did not include preventive measures (see report OTIF/RID/CE/GTP/2014-A, paragraphs 23 and 24).

Activities in the European Union in connection with mitigating the effects of freight train derailments

6. With the help of the presentation in Annex III, the representatives of the European Commission and ERA described the studies on derailments that had been carried out since 2007. These studies had led to the recommendation that fitting dangerous goods tank-wagons with mechanical derailment detectors should not be made mandatory, as there were other measures which were more effective in terms of reducing risks and which had a better cost/benefit ratio than mechanical derailment detection.

7. The representative of ERA pointed out that many detailed assessment reports on the subject of derailment detection had been issued from 2009 to 2012, including an independent assessment by DNV, which confirmed ERA's findings concerning, in particular, the problems that are specific to mechanical detection with automatic braking and potential false-alarms.

8. The representative of ERA informed the working group that his understanding of the European Council decision was that ERA had been given a mandate to study the potential future use of derailment detection, taking into account technical and scientific progress. This was why ERA was interested to learn from this group of any new findings or facts which should be considered in comparison with the previous detailed impact assessments and study results.

9. The representative of ERA also referred to the D-Rail project, the aim of which was to reduce the effects of derailments over the long term and permanently. With regard to developments in the near future, the representative of the European Commission indicated that in its Strategic Master Plan, the Shift2Rail Joint Undertaking also included two objectives dealing with the carriage of dangerous goods by rail.

Derailment detection in Switzerland

10. The representative of Switzerland informed the working group about the more than ten years experience with mechanical derailment detectors in Switzerland (see presentation in Annex IV). He explained that in Switzerland, the safety policy in the carriage of dangerous goods by rail was based on an integrated risk assessment. Without suitable safety measures, the risks, which were currently still acceptable, would reach an unacceptable level in the next 10 to 15 years due to the growing population, the population density alongside railway lines and the increasing quantity of goods being carried.

11. At present, more than 1000 dangerous goods wagons in Switzerland were fitted with EDT 101 mechanical derailment detectors made by Knorr-Bremse. According to information from the carrier SBB Cargo, there were one or two false alarms each year, although these were due to serious defects in the railway infrastructure. The cost of fitting new wagons was 1200 Euro/wagon and the cost of retrofitting older wagons was 2200 Euro/wagon. However, as derailment detectors not only prevented the possible catastrophic consequences of a de-

railment, but also reduced the costs incurred after less serious derailments, this investment was economically viable for the industry.

12. The representative of ERA pointed out that unlike most EU Member States, Switzerland had a highly developed safety management system and comprehensive real time monitoring of the system. The EU Member States should therefore give priority to setting up a functioning safety management system.

13. In reply to the question raised by the representative of ERA, the representative of Switzerland explained that the wagons equipped with DDDs in Switzerland had been authorised on the basis of UIC leaflet 541-08.

EDT 101 derailment detector

14. Using the presentation in Annex V, the representative of UNIFE explained how the EDT 101 mechanical derailment detector works. Following several tank-wagon derailments, notably in Switzerland, in the 1990s, 2500 type EDT 100 derailment detectors were initially fitted, 700 of which were subsequently replaced with the EDT 101 type. Once the activation threshold had been adjusted, 1714 EDT 101 derailment detectors were delivered to Germany, Switzerland, Slovenia, France, Russia and South Africa. Whereas there were still some false alarms with the EDT 100 derailment detector – although they did not lead to any unsafe conditions in the train – Knorr-Bremse was not aware of any further false alarms having occurred with the EDT 101.

15. The representative of ERA noted that other products similar to the EDT 101 were now available, for which no feedback on operational experiences was available and which had not been taken into account in the UNIFE presentation.

Derailment detection in freight trains – Analysis of the influences on the longitudinal forces

16. The presentation by the Technical University of Berlin (see Annex VI) dealt with the statement in the DNV study that "a false alarm of such a device may lead to train compression which is a contributory cause of freight train derailments (and also a significant operational disruption)". To investigate this, a simulation was carried out with a train consisting of 40 tank-wagons, which corresponds to a maximum train length of 700 m.

17. The study came to the conclusion that the locomotive driver can only detect derailments based on the dynamic behaviour of the locomotive if a derailment occurs not further back than the fifth wagon of a train. Derailment detectors would help locomotive drivers to detect derailments. If emergency braking is initiated anywhere in the train, the longitudinal compressive forces may be greater than in emergency braking activated by the locomotive driver, although they would still be below the critical value of 300 kN. However, these longitudinal forces could be reduced by reducing the evacuation pressure in the main brake pipe, which would lead to the braking distance being slightly increased.

Railway accident in Formia (Italy) – Hypothetical effectiveness of derailment detectors

18. In his presentation (see Annex VII), the representative of Italy's national investigation body (NIB-IT) reported the findings of a study which, based on a computer simulation of a railway accident that occurred in 2013 at Formia railway station, assessed the hypothetical effect derailments detectors would have had.

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19. The freight train that derailed not far from Formia consisted of 17 empty wagons. The locomotive driver did not notice the derailment and the train continued its journey for another 9 km. At Formia station, the last four wagons collided with a platform, 100 m of which they partly destroyed. Fortunately, as the accident occurred at night, nobody was on the platform. After the main brake pipe was disconnected the train finally came to a stop.

20. The accident caused 4 million Euro worth of damage to the infrastructure and rolling stock. According to a statistical assessment of the risk to people, there is an 83% chance at Formia station that a freight train will travel through the station at the same time as people are on the platforms. In this case, the estimated injury to persons would have been 21.8 million Euros.

21. The computer simulation shows that if the wagons had been equipped with derailment detectors, the train would have stopped after 550 m and the total damage would have reached the relatively low sum of 126,000 Euros.

22. The representative of ERA noted that the different categories of derailments experienced by Italy, including the most severe, had been taken into account in ERA's impact assessments of 2009 and 2012. The DNV study also took this type of accident into account.

Trenitalia's activities in connection with derailment detection

23. The representative of the Italian railway undertaking Trenitalia informed the working group of his company's activities in connection with derailment detection (see presentation in Annex VIII). Trenitalia intended to carry out some operational tests to assess the performance and reliability of the UIC approved derailment detectors.

24. Trenitalia was also involved in research projects aimed at developing new types of derailment detectors. These were primarily electronic derailment detectors fitted with electronic sensors and monitored and controlled by on-board electronic equipment. The advantages of electronic derailment detectors lay not just in the reduction of false alarms and the possibility of transmitting signals to the locomotive driver, but also in the prevention of derailments in the event of wheelset defects.

25. The representative of ERA welcomed the development of electronic derailment detectors, as suggested in ERA's 2012 impact assessment report (see section 6.1.3 of ERA's 2012 report). As the RID Committee of Experts had already preferred an electronic system as early as 2002, the representative of Germany was of the view that it should be checked which conditions existed today that were considered to have been technically unfeasible in 2002.

Formulation of questions

26. Taking as a basis documents OTIF/RID/CE/GTDD/2014/3 and …/2014/4 submitted by the representatives of the Netherlands and France, the working group formulated questions relating to the mechanical derailment detector and possible alternatives that are already identifiable (see Annex I). This list will be updated at the next session of the working group.[1]

27. The representative of ERA explained that most of the questions raised during this meeting had been already answered in detail by ERA and DNV and therefore, responding to the same questions today would not provide much new information compared to ERA's (2009 and 2012) and DNV's (2011) reports. In order to give ERA a new mandate for the revision of its 2009 and 2012 impact assessments, the representative of ERA was of the view that it would be neces-

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[1] Note by the Secretariat: as it was not possible to finalise the list of questions at this session of the working group, it will not be possible to submit them to the final conference on the D-Rail project (Stockholm, 12 November 2014) as originally planned by the RID Committee of Experts' standing working group (see report OTIF/RID/CE/GTP/2014-A, paragraph 24).

sary to obtain significant new facts and information which might not have been identified in these previous studies.

28. The chairman noted that the RID Committee of Experts would have to provide a better insight into whether and how detection devices could be an effective way of improving safety in the transport of dangerous goods. Whereas in the past, concerns had been expressed in terms of safety and operations, this should be dealt with by responding to various questions relating to detection devices.

Next meeting

29. The next session of the working group will be held from 24 to 26 February 2015 at the invitation of either Germany or Switzerland.

30. The chairman thanked the representatives of Italy for the good organisation of this meeting.

31. The representative of France thanked the chairman for his decisive chairmanship of this meeting.

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Annex I

Questions relating to the mechanical derailment detector and possible alternatives that are already identifiable

Detection of derailments

1. What are the advantages/disadvantages of derailment detection?

   Replies:

   Since 2009, the number of derailments has decreased due to various safety measures (figures needed). Derailments happen. Although the DDD will not prevent a primary derailment from occurring, it can mitigate the consequences of a derailment. The continued movement of de-railed wagons along the track will lead to damage to the infrastructure and rolling stock and can lead to the overturning of wagons and leakage from tanks.

2. When fitted to all dangerous goods wagons or to a particular type of dangerous goods wagon, to what extent is the derailment detector capable of preventing those effects of a derailment which may lead to the leakage of dangerous goods?

3. What is the benefit of fitting a DDD to some or all wagons in a train?

4. Are there any findings to demonstrate that safety measures relating to derailment detection are no longer necessary

   a) in general,

   b) in the context of dangerous goods only?

5. Must it be assumed that derailments will continue to happen in future and must therefore be taken into account in the transport of dangerous goods?

   ~~*Replies:*~~

   ~~Since 2009, the number of derailments has decreased due to various safety measures (figures needed). Derailments happen. Although the DDD will not prevent a primary derailment from occurring, it can mitigate the consequences of a derailment. The continued movement of de-railed wagons along the track will lead to damage to the infrastructure and rolling stock and can lead to the overturning of wagons and leakage from tanks.~~

6. Are there any developments in rail transport (e.g. new brake blocks) which might raise new questions on operating safety?

   Note: Information from the safety authorities on the implementation of the technical measures recommended by DNV.

Mechanical derailment detection device (automatic braking)

1. What are the advantages/disadvantages of automatic braking (e.g. rapid reaction; (no) overriding of emergency stop; (no) decision made by the driver)?

2. Is there a legal problem with automatic braking in view of the TSI on tunnel safety?

3. Is a standard available for the functionalities and performance of DDD?

4. How is it assessed whether a type of DDD is suitable to be fitted to wagons?

5. How reliable are the DDDs currently available on the market in terms of detection (false alarm, no alarm, low temperature conditions)?

6. How is the definition of false alarm to be understood in this context?

7. What are the problems caused by false alarms?

8. How many DDD manufacturers are there?

9. How could the number of system types available be increased?

10. What are the costs of DDD (apparatus, installation, maintenance, overhaul)? Distinguish between the current price and the price expected in future.

11. How does automatic braking influence the behaviour of the train (e.g. uncoupling)?

12. What are the experiences with DDD already in use for transport?

Alternative derailment detection arrangements (wagon related or not)

1. Which detection arrangements, apart from DDD, can be identified? (e.g. electronic detectors with/without cable along the train)

2. What are the advantages and disadvantages of these alternatives?

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Annex II

Liste des participants
Teilnehmerliste
List of participants

I. Gouvernements/Regierungen/Governments

Allemagne/Deutschland/Germany

Mr H. **Rein**

Belgique/Belgien/Belgium

Ms C. **Bailleux**

Bosnie-Herzégovine/Bosnien-Herzegowina/Bosnia-Herzegovina

Mr D. **Glamocanin**

Finlande/Finnland/Finland

Mr J. **Karhunen**

France/Frankreich/France

Mr C. **Pfauvadel**
Mr S. **Vignot**
Mr A. **Godart**

Italie/Italien/Italy

Mr B. **Legittimo**
Mr R. **Cammarata**
Mr R. **Lucani**
Mr M. **Costa**
Mr M. **Caposciutti** (Trenitalia)
Mr S. **Guidi** (Trenitalia)
Mr P. **Presciani** (Trenitalia)
Mr P. **Mattera** (Knorr-Bremse)

Monténégro/Montenegro/Montenegro

Mr Z. **Vukovic**

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Norvège/Norwegen/Norway

Mr K. **Johansen**

Pays-Bas/Niederlande/Netherlands

Mr K. **Tiemersma**

Suisse/Schweiz/Switzerland

Mr C. **Bonnet**
Mr D. **Bing** (TU Berlin)
Mr B. **Gutzwiller** (SBB Cargo)

Royaume-Uni/Vereinigtes Königreich/United Kingdom

Mr A. **Bale**

II. Organisations internationales gouvernementales/ Internationale Regierungsorganisationen/ International governmental organisations

Union européenne/Europäische Union/European Union

Ms A. **San Martin**
Ms A. **Osesiak**

Agence ferroviaire européenne/Europäische Eisenbahn-Agentur/European Railway Agency (ERA)

Mr E. **Ruffin**
Mr A. **Schirmer**

III. Organisations internationales non gouvernementales Internationale Nichtregierungsorganisationen International non-governmental organisations

CEFIC

Mr T. **Klein**

CER

Mr J. B. **Simonnet** (14/15.10.2014)

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UIP

Mr S. **Franke**

UNIFE

Mr M. **Walter**

IV. Secrétariat/Sekretariat/Secretariat

Mr J. **Conrad**
Ms K. **Guricová**
Mr B. **Leermakers**

V. Interprètes/Dolmetscher/Interpreters

Mr W. **Küpper**
Mr D. **Ashman**

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