UNECE

Railways role in intermodality and the digitalization of transport documents

UNITED NATIONS

RAILWAYS ROLE IN INTERMODALITY AND THE DIGITALIZATION OF TRANSPORT DOCUMENTS

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Note

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UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

The United Nations Economic Commission for Europe (UNECE) is one of the five United Nations regional commissions, administered by the Economic and Social Council (ECOSOC). It was established in 1947 with the mandate to help rebuild post-war Europe, develop economic activity and strengthen economic relations among European countries, and between Europe and the rest of the world. During the Cold War, UNECE served as a unique forum for economic dialogue and cooperation between East and West. Despite the complexity of this period, significant achievements were made, with consensus reached on numerous harmonization and standardization agreements.

In the post-Cold War era, UNECE acquired not only many new member States, but also new functions. Since the early 1990s the organization has focused on analyses of the transition process, using its harmonization experience to facilitate the integration of Central and Eastern European countries into the global markets.

UNECE is the forum where the countries of western, central and eastern Europe, central Asia and North America – 56 countries in all – come together to forge the tools of their economic cooperation. That cooperation concerns economics, statistics, environment, transport, trade, sustainable energy, timber and habitat. The Commission offers a regional framework for the elaboration and harmonization of conventions, norms and standards. The Commission's experts provide technical assistance to the countries of South-East Europe and the Commonwealth of Independent States. This assistance takes the form of advisory services, training seminars and workshops where countries can share their experiences and best practices.

TRANSPORT IN UNECE

The UNECE Sustainable Transport Division is the secretariat of the Inland Transport Committee (ITC) and the ECOSOC Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals. The ITC and its 17 working parties, as well as the ECOSOC Committee and its sub-committees are intergovernmental decision-making bodies that work to improve the daily lives of people and businesses around the world, in measurable ways and with concrete actions, to enhance traffic safety, environmental performance, energy efficiency and the competitiveness of the transport sector.

The ECOSOC Committee was set up in 1953 by the Secretary-General of the United Nations at the request of the Economic and Social Council to elaborate recommendations on the transport of dangerous goods. Its mandate was extended to the global (multi-sectoral) harmonization of systems of classification and labelling of chemicals in 1999. It is composed of experts from countries which possess the relevant expertise and experience in the international trade and transport of dangerous goods and chemicals. Its membership is restricted to reflect a proper geographical balance between all regions of the world and to ensure adequate participation of developing countries. Although the Committee is a subsidiary body of ECOSOC, the Secretary-General decided in 1963 that the secretariat services would be provided by the UNECE Sustainable Transport Division.

ITC is a unique intergovernmental forum that was set up in 1947 to support the reconstruction of transport connections in post-war Europe. Over the years, it has specialized in facilitating the harmonized and sustainable development of inland modes of transport. The main results of this persevering and ongoing work are reflected, among other things, (i) in 58 United Nations conventions and many more technical regulations, which are updated on a regular basis and provide an international legal framework for the sustainable development of national and international road, rail, inland water and intermodal transport, including the transport of dangerous goods, as well as the construction and inspection of road motor vehicles; (ii) in the Trans-European North-south Motorway, Trans-European Railway and the Euro-Asia Transport Links projects, that facilitate multi-country coordination of transport infrastructure investment programmes; (iii) in the TIR system, which is a global customs transit facilitation solution; (iv) in the tool called For Future Inland Transport Systems (ForFITS), which can assist national and local governments to monitor carbon dioxide (CO_2) emissions coming from inland transport modes and to select and design climate change mitigation policies, based on their impact and adapted to local conditions; (v) in transport statistics – methods and data – that are internationally agreed on; (vi) in studies and reports that help transport policy development by addressing timely issues, based on cutting-edge research and analysis. ITC also devotes special attention to Intelligent Transport Services (ITS), sustainable urban mobility and city logistics, as well as to increasing the resilience of transport networks and services in response to climate change adaptation and security challenges.

In addition, the UNECE Sustainable Transport and Environment Divisions, together with the World Health Organization (WHO) – Europe, co-service the Transport Health and Environment Pan-European Programme (THE PEP).

CONTENTS

1. INTRODUCTION

The present report concerns intermodal transport, with a particular focus on the role of railways in intermodality and the importance of transport documents computerisation for intermodal transport.

The report is divided in three main parts: a first section discusses intermodality and the role of railways by providing data on the significance of the contribution of railways to intermodal transport drawing from official statistics. The discussion of the role of railways in intermodality continues with the illustration of case studies of intermodal transport involving rail in the ECE region.

A second section looks at transport document computerisation and at the importance of the shift towards e-documents as well as to risks and barriers.

The third section reports the case studies discussed during the workshop on Railways, intermodal transport and the computerization of transport documents held in Geneva on 23 November 2017 during the sixtieth session of the Working Party on Intermodal Transport and Logistics. This section is further divided in two parts, one devoted to case studies discussed in relation to the role of railways in intermodality and one dedicated to the computerisation of transport documents.

A section on recommendations closes the report.

2. RAILWAYS AND INTERMODAL TRANSPORT

2.1 The role of railways in intermodal transport

2.1.1 INTERMODAL TRANSPORT AND RAILWAYS

Intermodal transport is by definition “the movement of goods in one and the same loading unit or road vehicle, which uses successively two or more modes of transport without handling the goods themselves in changing mode” (United Nations Economic Commission for Europe (UNECE), 2001). Railways may contribute to intermodal transport of either loading units (containers, swap bodies) or road vehicles (semi-trailers, trucks) as part of transport chains involving road, maritime or inland waterway transport.

Intermodal transport by rail entails transport on trains of **accompanied or unaccompanied intermodal transport units**. Accompanied transport refers to the transport of trucks, also trailers and tractors, with their drivers, who are accommodated on suitable coaches included in the same train as the carriages for the vehicles. Accompanied transport accounts for a small portion of overall intermodal transport by rail.

The largest part of intermodal rail operations refers to unaccompanied transport. Unaccompanied intermodal rail transport consists of transporting containers, swap bodies as well as semitrailers without their drivers. The intermodal transport units are taken by another mode (most often vessel or road) to a departing intermodal terminal and transported by rail to a destination terminal where, if relevant, they continue their journey with another mode. For instance, they may be picked up by a truck or tractor for delivery to the final destination or loaded onto a container vessel.

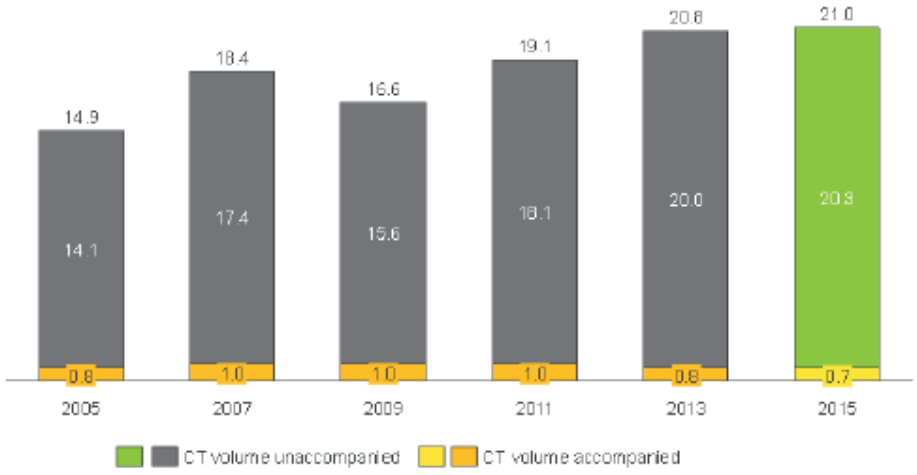
As mentioned above, intermodal transport by rail may be part of a maritime transport chain, involving a maritime leg, or a of a continental transport chain. The two transport chains differ for the sort of intermodal transport units used. **Maritime intermodal transport** entails the use of International Organization for Standardization (ISO) containers that may fit into container vessels (20', 40' ISO containers). Trucks or tractors with semitrailers may be part of motorways of the sea transport chains. **Continental transport** involves transport of containers (ISO standard containers and others suitable only for continental transport), swap bodies, semitrailers and trucks.

A final distinction of intermodal transport refers to whether it is **international or domestic**.

2.2 EVOLUTION AND CURRENT SIGNIFICANCE OF INTERMODAL RAIL TRANSPORT

2.2.1 EUROPE: THE EUROPEAN UNION, THE EUROPAN ECONOMIC AREA AND SWITZERLAND

Figures by the International Union of Railways (UIC) (2017a) indicate a growth of intermodal rail transport in recent years after the decrease registered in 2009. As of 2015, the latest year for which UIC figures are available, intermodal rail transport in Europe amounted to 231 million tonnes/year transported in 21.6 million Twenty-foot Equivalent Units (TEUs). The number of TEUs in intermodal transport recorded by the UIC analysis is depicted in Figure 1 and shows that, as mentioned in the previous section, the vast majority of intermodal transport is made up by unaccompanied units: in 2015, 218 million tonnes of cargo were transported as unaccompanied transport, contained in 20.8 million TEU, which is to say that more than 94 per cent of tonnes transported and more than 96 per cent of TEUs referred to unaccompanied transport. Analysing those figures UIC (2017a) notes that the weight per TEU is increasing over recent years so, on average, intermodal transport units are laden with heavier cargo.



Source: BSL Transportation analysis, UIRR.

Figure 1. Development of combined transport volumes from 2005 to 2015 in million TEU (Source: UIC, 2017a).

Segment	2005	2007	2009	2011	2013	2015
Unaccompanied	145.5	181.5	164.6	191.8	203.0	218.0
Accompanied	10.2	13.6	15.1	14.9	10.8	13.0
	155.7	195.1	179.7	206.7	213.8	231.0

Table 1. Development of combined cargo volumes in Europe in million tonnes (Source: UIC, 2017a)

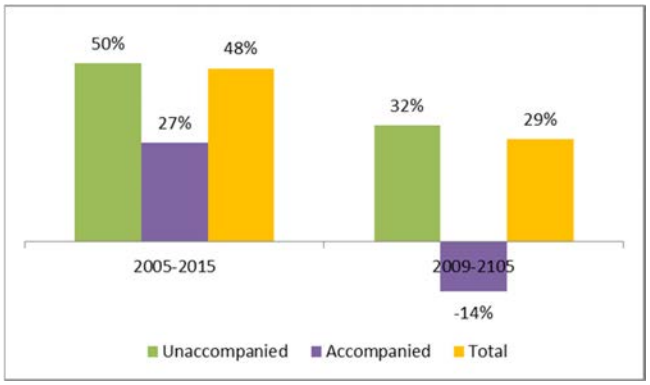


Figure 2. Development of combined transport volumes from 2005 to 2015 in million tonnes (Source: elaboration on data from UIC, 2017a).

Table 1 and Figure 2 chart the evolution of combined transport in tonnes from 2005 to 2015 and show the marked increase of both unaccompanied and accompanied intermodal transport by rail with both segments well beyond 2005 levels but with accompanied intermodal in 2015 at a lower level than in 2009, although doing better than two years before.

Taking a wider outlook, Eurostat data indicate a stable modal split for rail transport in overall cargo transport (accounting for intermodal and other rail transport). Figure 3 shows that in the EU28 17.9 per cent of tonne-km of cargo were transported by rail while Figure 4, which focuses on the EU 15, indicates a slightly growing trend over the past years toward a share of 16.8 per cent of tonne-km in 2015.

Note in Figure 3 and Figure 4 the indication of the trend of tonne-km by rail and its lowest point in 2009 followed by an increase. The data are available until 2011 only, due to missing information for Belgium. However, investigating the trend for the other EU Member States together, the increase continues. Therefore, data for tonne-km by rail in general have trends similar to those for TEUs and tonnes in intermodal transport reported by UIC (2017a).

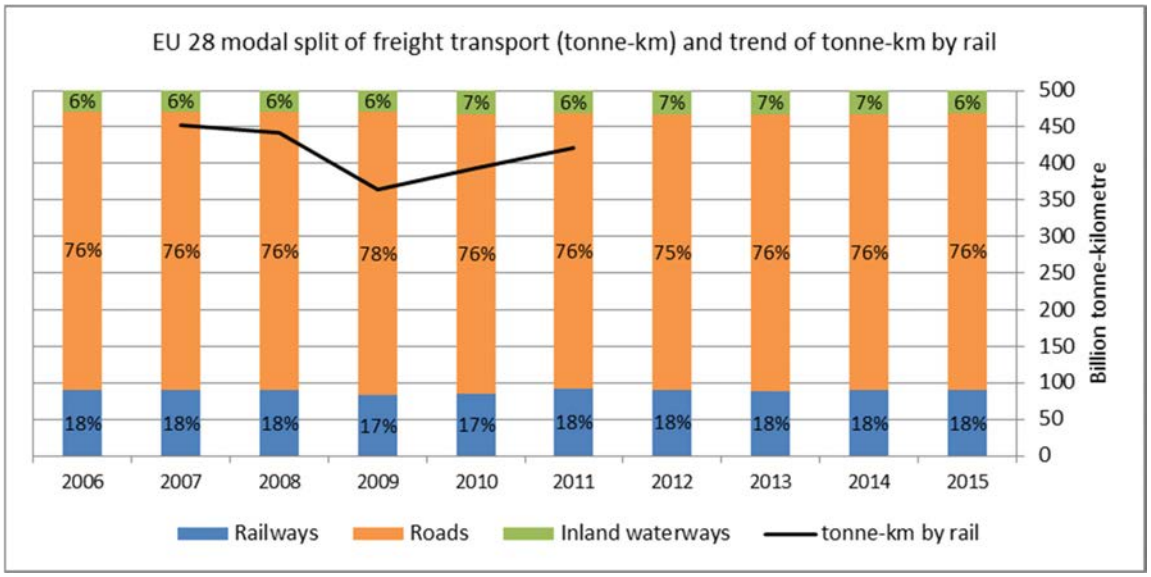


Figure 3. EU 28 modal split of inland freight transport (tonne-km) and trend of rail performance in tonne-km (elaboration on Eurostat data).

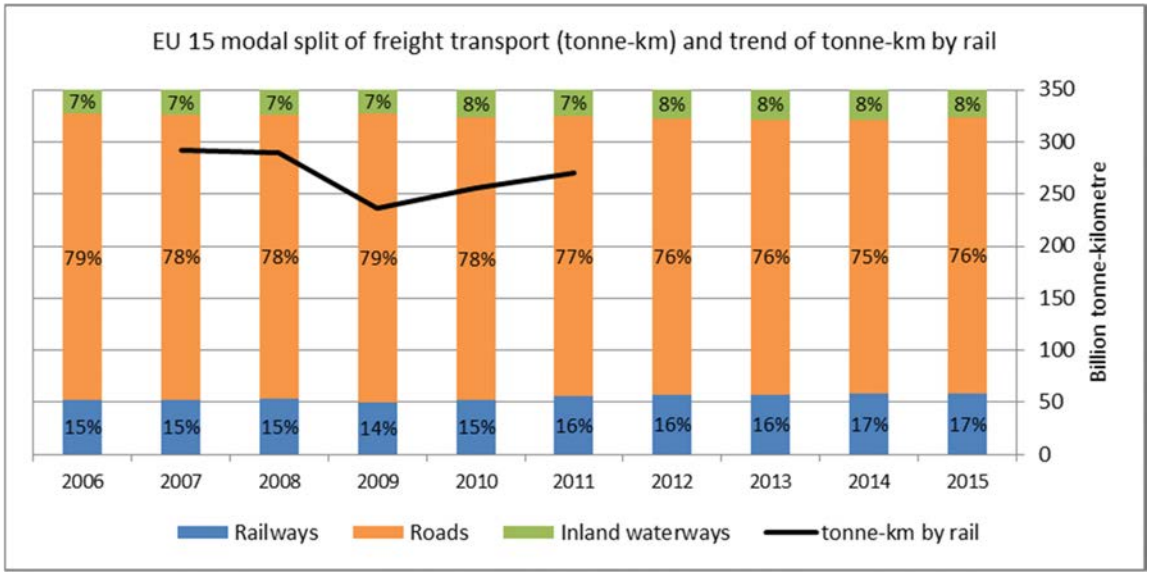


Figure 4. EU 15 modal split of inland freight transport (tonne-km) and trend of rail performance in tonne-km (elaboration on Eurostat data).

The data in Figure 5 refer to the EU28 reveal an increasing trend of unitization of goods transport by rail (though stabilizing for the latest available year). In 2015, 16.6 per cent of tonne-km by rail were unitized. The unitization of road transport in the same context is stable, although it should be noted that the figures are referred to tonne-kilometre so, if a shift of unitized goods transport to rail has occurred, the road legs are likely shorter and therefore account for less tonnes-km.

The data on EU28 by Eurostat allow us to look further in detail at the percentage of tonne-km carried by rail in containers (therefore a part of unaccompanied transport only). The figures are summarised and compared for the years 2009 and 2015 in Figure 6 and illustrate that behind the general stability of unitization in railways shown in Figure 5 there are different situations, some with significant growth of the percentage of tonne-km by rail and some with marked decreases. Figure 6 indicates, for instance, important percentage increases in the Czech Republic, Ireland, Greece, Spain, Portugal Poland, Slovenia and Slovakia, whereas marked decreases have been registered in Bulgaria, Denmark, the Netherlands and Sweden. There are also cases of stability such as Germany, Italy and Poland.

Figure 7 refers to the much more limited market of semitrailers carried by rail. Semitrailers on trains were historically the initial form of intermodal transport in the United States of America as recalled by Siedelmann (2010), and Figure 7 reveals that their transport is increasing in several European countries, especially those along the North-South axis across central Europe: Austria, Denmark, Germany, Italy and Sweden. This is an effect of the limitation to truck traffic in Austria and Switzerland.

Figure 8 depicts the 2009-2015 trends for accompanied intermodal transport for those European Union (EU) countries where such type of transport exists. Also, in this case the countries along the North-South axis across central Europe show percentage increases.

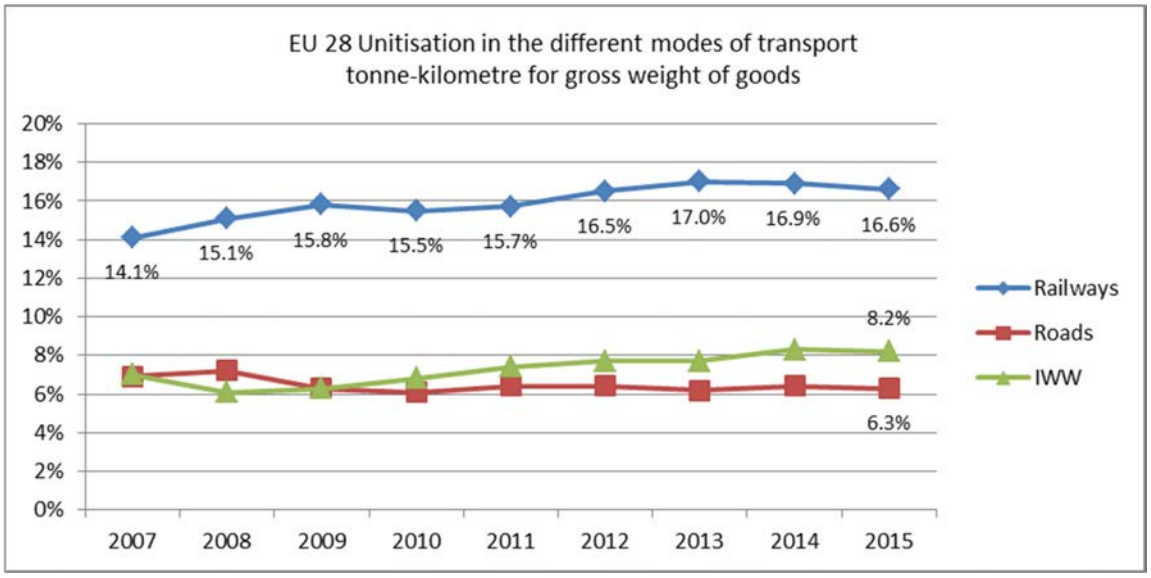


Figure 5. Unitisation in the different inland modes of transport in the EU28 — tonne-kilometre for gross weight of goods (elaboration on Eurostat data).

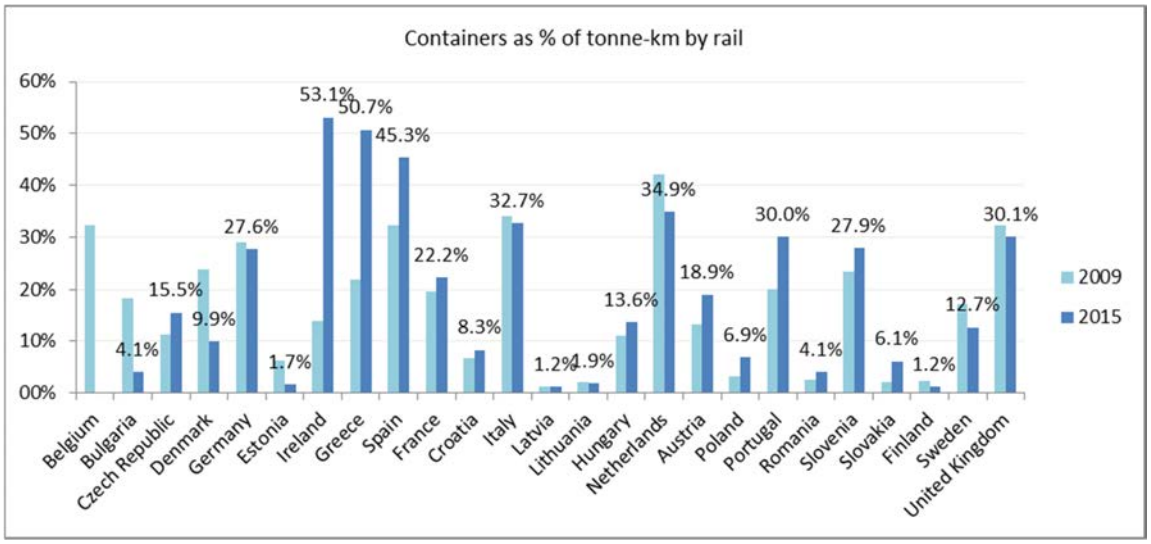


Figure 6. Tonne-km by rail of containerised goods as a percentage of total tonne-km by rail for the countries belonging to the EU28. Comparison of the data for 2009 and 2015. Only the percentages for the year 2015 are included in the chart (elaboration on Eurostat data).

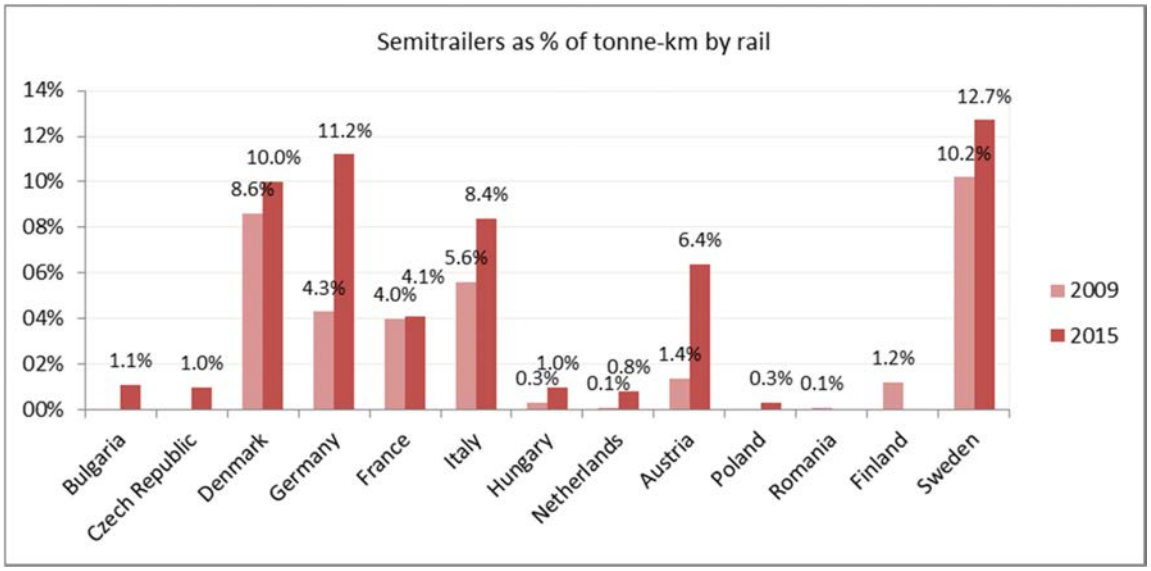


Figure 7. Tonne-km by rail of goods in semi-trailers as a percentage of total tonne-km by rail for the EU28 countries reporting this type of traffic. Comparison of the data for 2009 and 2015 (elaboration on Eurostat data).

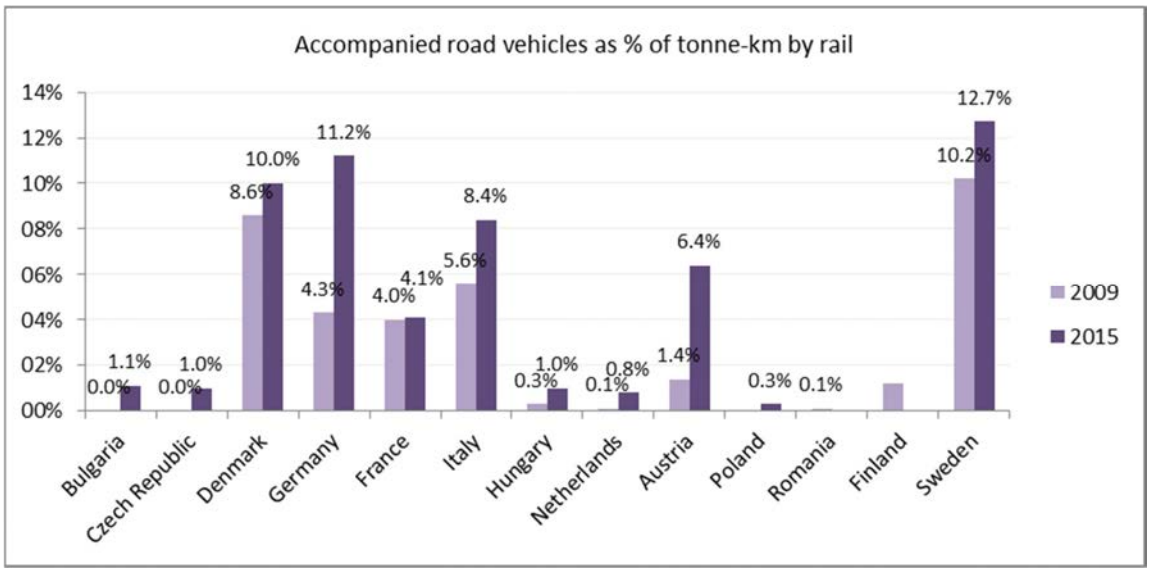


Figure 8. Tonne-km by rail of goods in accompanied road vehicles as a percentage of total tonne-km by rail for the EU28 countries reporting this type of traffic. Comparison of the data for 2009 and 2015 (elaboration on Eurostat data).

Some of the trends described above by comparing the 2009 and 2015 figures are further analysed in the following figures that depict trends per country. In the interest of space the trends charted here refer only to a selection of countries. The selection has been carried out considering the countries with the largest performance in tonne-km by rail, with the largest amount of international and transit transport (all based on Eurostat data referred to 2015), with the largest performance of intermodal transport.

Germany, France and Poland stand out as the largest rail markets in terms of tonne-km. Figure 9 shows that in Germany rail share and rail tonne-km are increasing. Tonne-km by semitrailers are showing a marked increase while the percentage importance of tonne-km by containers and swap bodies is decreasing. This contrasting percentage trends for semitrailers and containers and swap bodies can be seen also in Denmark (Figure 16), Norway (Figure 20) and Sweden (Figure 18).

Poland is experiencing a slight increase in tonne-km by rail which contrasts with a steadily decreasing rail share (see Figure 10). The percentage importance of unaccompanied intermodal transport is much more limited: intermodal transport by rail refers almost exclusively to containers while semi-trailers have a very limited share, increasing only recently.

In France (Figure 11) tonne-km by rail and, especially, rail share is increasing after a period of stability. Transport of semitrailers records a steady increase in performance while the 2015 data point, the latest available, shows a change from the sustained increase in tonne-km by containers and swap bodies visible until 2014.

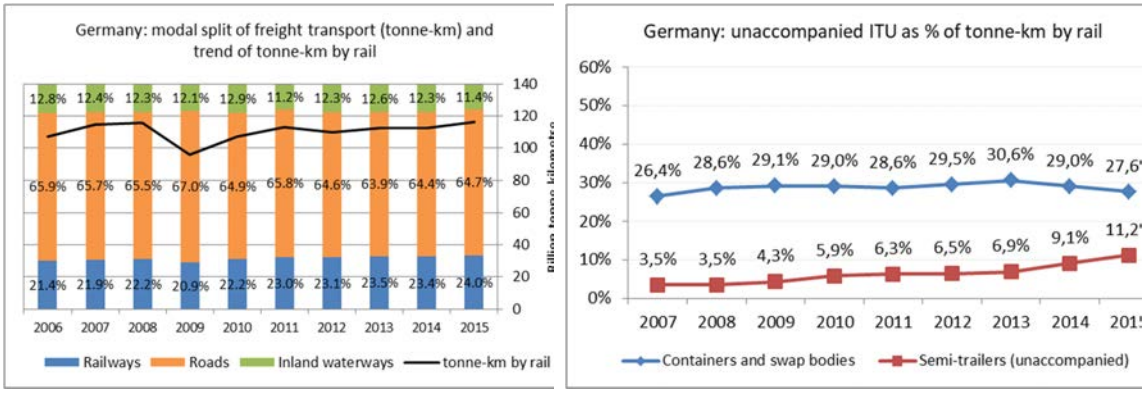


Figure 9. Germany: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

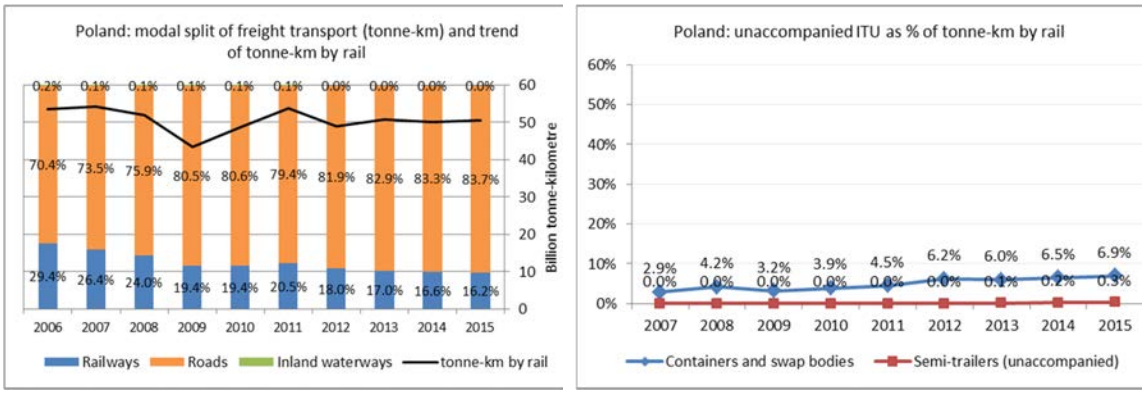


Figure 10. Poland: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

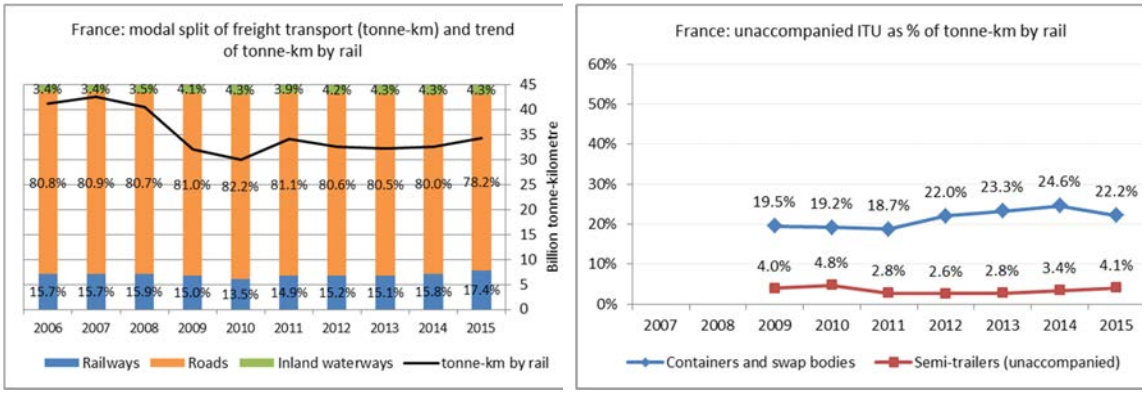


Figure 11. France: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

Countries with the largest share of international or transit traffic include Latvia, Greece, the Netherlands and Slovenia. Figure 12 shows the very large share of rail in Latvia, which goes with a rather stable trend in tonne-km. However, the percentage importance of intermodal transport –comprising containers and swap bodies only- is very limited. Qualitatively this picture is similar also for Finland, Lithuania and Estonia, all countries where rail shares are particularly high –though not as much as in Latvia- but most traffic refers to bulk cargo, with intermodal being only of minor importance.

In Greece, rail activity is comparatively limited and road modal share reaches 98.5 per cent (Figure 13). Much rail traffic is international and a sharp increase in the relative importance of containers on rail performance was recently recorded. However, the Organisation for Economic Co-operation and Development (OECD) figures for TEU/year (not depicted) do not seem to suggest a similar marked increase.

The Netherlands show a relatively small rail share and an increasing trend of tonne-km, more than a third of which are for containers and swap bodies, and an important share of international traffic as an effect of the maritime imports and exports (Figure 14).

Slovenia stands out for international traffic and for the increase in tonne-km by rail, an increasing fraction of which pertaining to containers and swap bodies, while semitrailers are no longer part of intermodal traffic in the country (Figure 15).

Denmark is very much a transit country in terms of rail traffic and shows an increasing trend in tonne-km with stable rail share (Figure 16). The relative importance of containers on rail tonne-km is decreasing over time while that of semitrailers is increasing, a trend similar to other countries on the North-South axis of Europe.

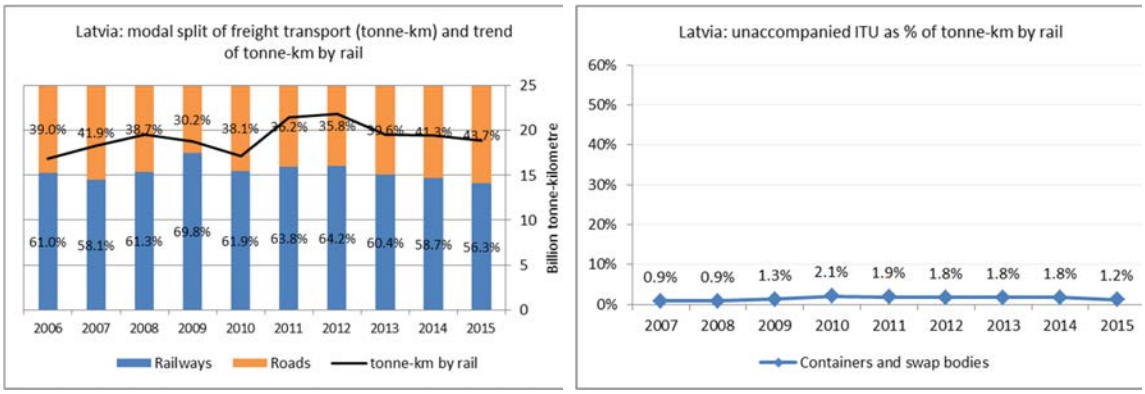


Figure 12. Latvia: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

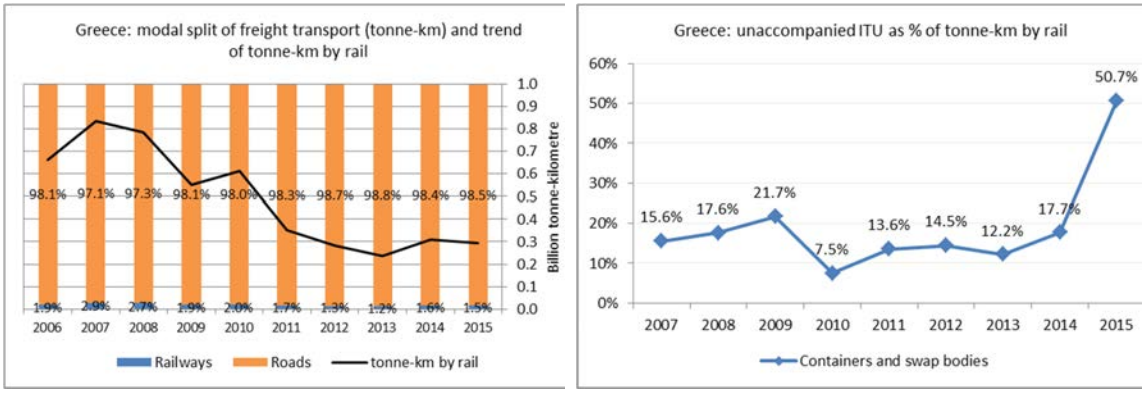


Figure 13. Greece: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

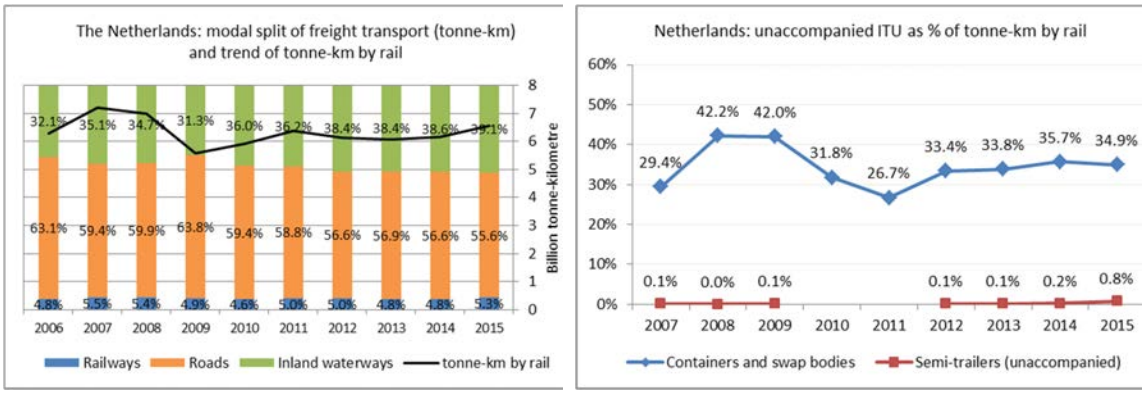


Figure 14. The Netherlands: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

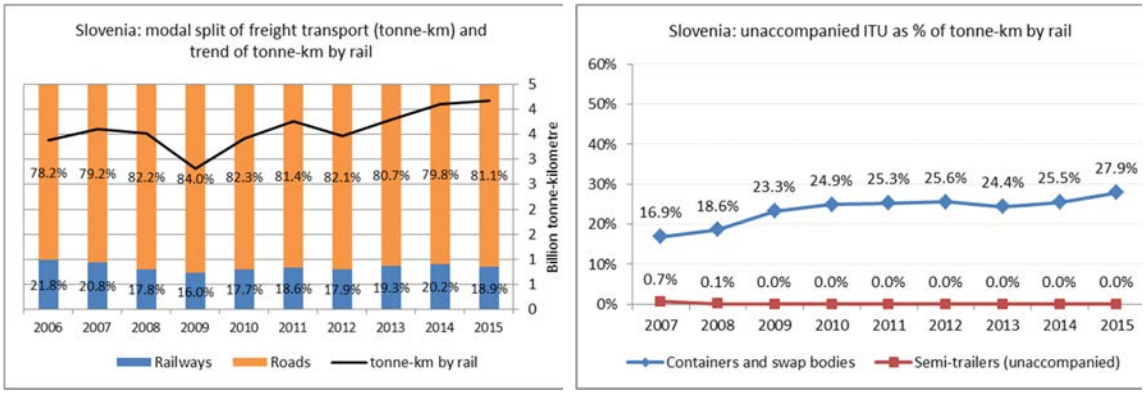


Figure 15. Slovenia: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

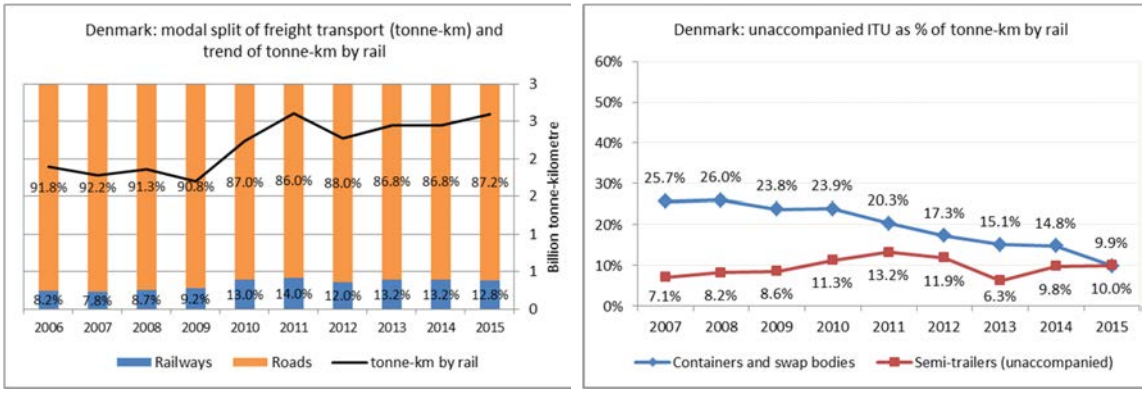


Figure 16. Denmark: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

Countries with the largest figures for tonne-km in containers and swap bodies include France (Figure 11), Germany (Figure 9) and Italy. Italy was also the fourth largest rail market in the EU in 2015. Figure 17 shows that it is undergoing a growth in tonne-km by rail and a parallel increase in rail share of cargo transport. Recent intermodal transport trends show that the relative importance of container and swap bodies on the total rail tonne-km is decreasing sharply, whereas transports of unaccompanied semitrailers are rather stable.

Germany, together with Italy and Sweden is one of the EU28 countries with the largest performance in terms of unaccompanied semitrailers. Although Sweden is one of the largest markets of rail cargo in the EU in terms of tonne-km, it is experiencing a reduction in tonne-km by rail whereas road transport is undergoing the opposite trend. Figure 18 shows that the already significant performance of semitrailers on rail is undergoing a percentage increase.

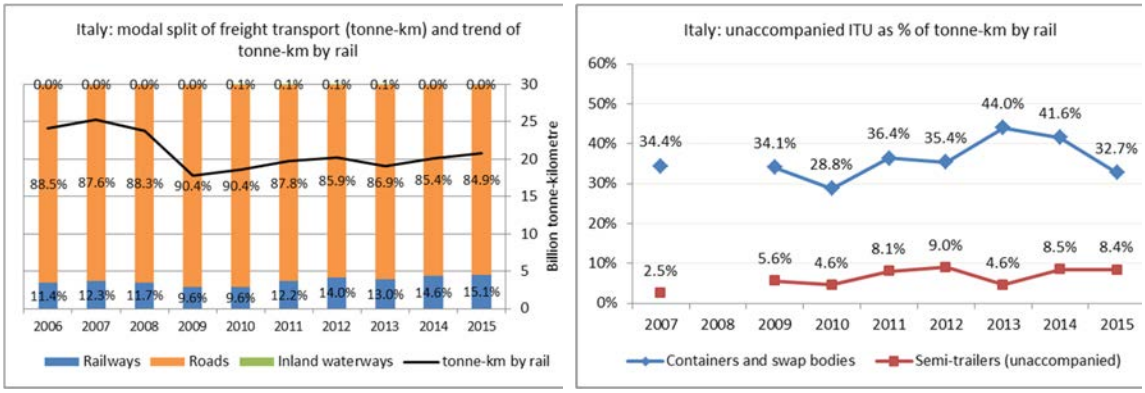


Figure 17. Italy: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

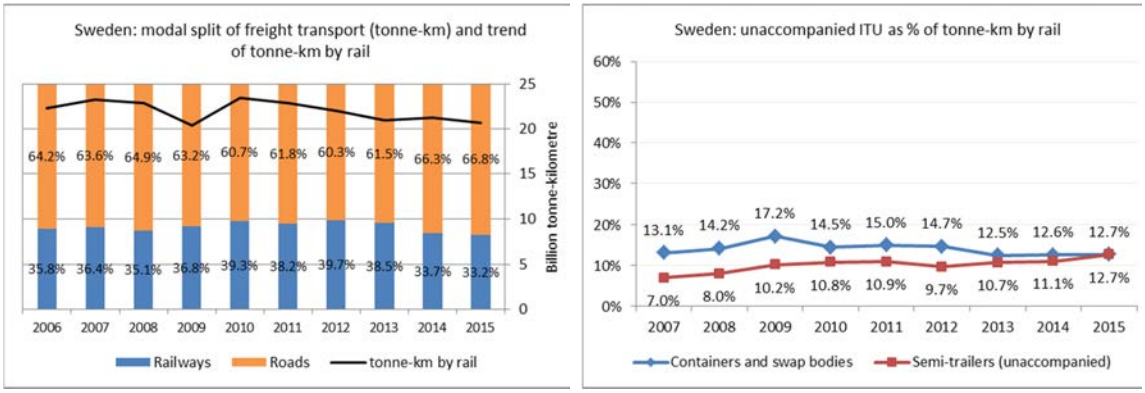


Figure 18. Sweden: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

Eurostat also publishes intermodal transport statistics for Norway (Figure 20) and Switzerland (Figure 19). All trends depicted in the charts for Switzerland are increasing. The remarkable 50 per cent rail share achieved in 2015 is accompanied by a very high percentage of intermodal traffic: more than 44 per cent of Swiss tonne-km by rail refer to intermodal transport units.

Norway is experiencing a steady trend in rail tonne-km, which contrasts with a decreasing rail share. Remarkably, in 2015 more than 60 per cent of rail tonne-km are intermodal with trends for the percentage of containers and semitrailers similar to those seen for Denmark, Germany and Sweden.

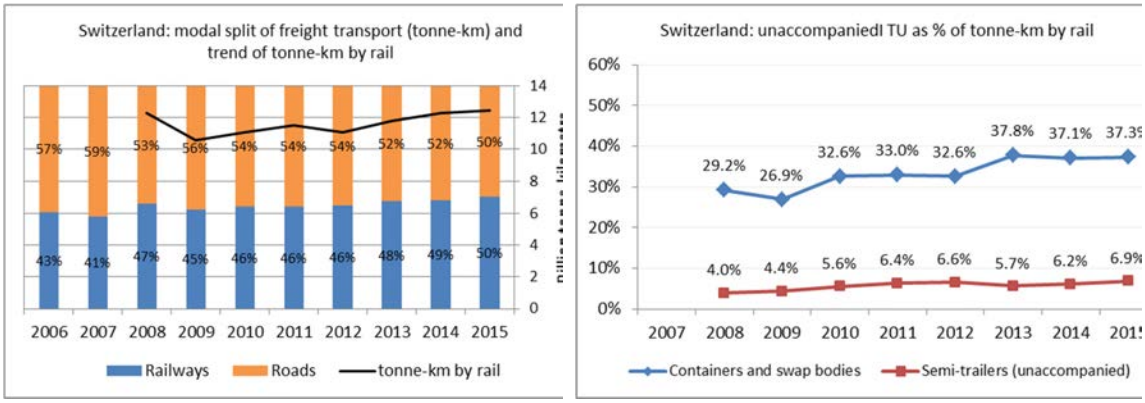


Figure 19. Switzerland: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data).

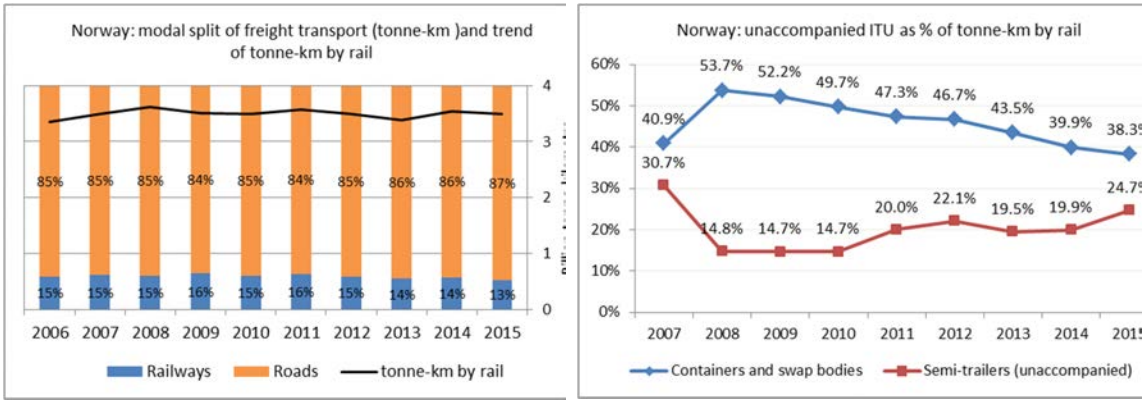


Figure 20. Norway: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right) (both charts are elaborations on Eurostat data) (elaboration on Eurostat data).

Eurostat also publishes statistics on the potential share of tonne and tonne-km that may be attracted to rail transport since they refer to trips by road for distances of 300 km or more, the range for which intermodal rail is generally understood to be convenient. A selection of such indicators, for EU28, Norway and Switzerland is reported respectively in Table 2, Table 3, Table 4. For EU28 it is remarkable that the share of containerised road traffic on distances longer than 300 km has decreased between 2009 and 2015. However, in 2015 almost 8 per cent of tonnes and almost 41 per cent of tonne-km could possibly be attracted to intermodal rail. Considering the data for Switzerland in 2009 in Table 4, there is limited room for attraction of intermodal to rail, consistently with the success of Swiss policies on transferring freight to rail.

		2009	2015
EU28	tonnes (% of tonnes)	85 117 000 (10.3%)	84 283 000 (7.9%)
	Mio tonnes-km (% of tonnes-km)	43 867 (46.9%)	41 194 (40.9%)

Table 2. Modal shift potential of long-distance road freight in containers in the EU28. (Data source: Eurostat)

		2009	2015
Norway	tonnes (% of tonnes)	1 357 000 (6.2%)	1 341 000 (6.2%)
	Mio tonnes-km (% of tonnes-km)	735 (38.8%)	802 (36.6%)

Table 3. Modal shift potential of long-distance road freight in containers in Norway. (Data source: Eurostat)

		2009	2015
Switzerland	tonnes (% of tonnes)	120 (0.4%)	n/a
	Mio tonnes-km (% of tonnes-km)	43 (4.2%)	n/a

Table 4. Modal shift potential of long-distance road freight in containers in Switzerland. (Data source: Eurostat)

2.2.2 OTHER EUROPEAN UNECE COUNTRIES

There is little information on intermodal transport in UNECE European countries not included in the previous section. Eurostat provides data for the Former Yugoslav Republic of Macedonia, depicted in Figure 21, which shows a decreasing trend of rail-tonne-km and rail share but a peak in tonne-km by containers and swap bodies in 2015 after several years of stability. In fact, traffic has slightly increased in absolute terms but the drop of total tonne-km makes the increase look particularly marked in percentage terms.

No information on intermodal rail was located for Albania, Bosnia and Herzegovina, Montenegro and Serbia. Overall rail transport is stable in terms of tonne-km in Albania and Bosnia-Herzegovina, while it is increasing in Serbia and Montenegro. It is also noteworthy that those countries, with the exception of Albania, have very high shares of rail tonne-km: about 30 per cent but following a decreasing trend for Bosnia-Herzegovina and beyond 40 per cent in Montenegro and Serbia.

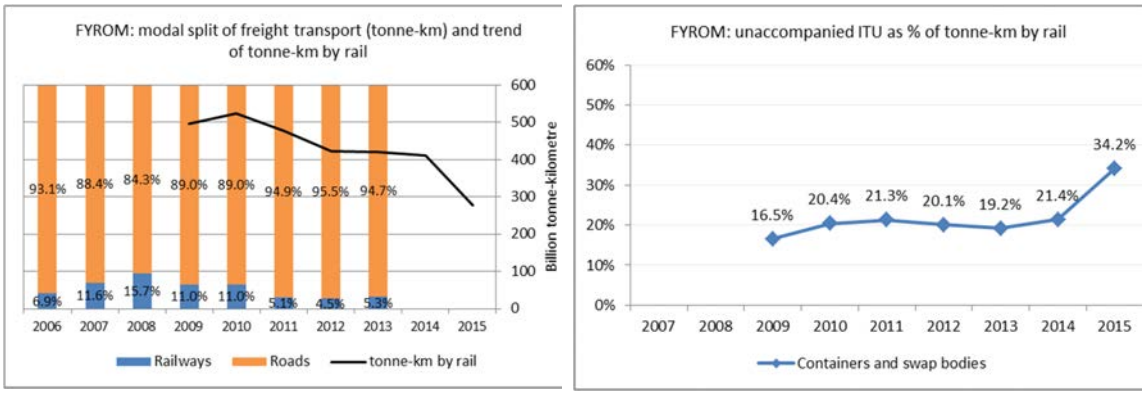


Figure 21. The Former Yugoslav Republic of Macedonia: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right). (Both charts are elaborations on Eurostat data).

2.2.3 TURKEY

Turkey has a rather stable volume of rail cargo in terms of tonne-km and rail share as depicted in Figure 22. The latter show that cargo transport in Turkey is predominantly by road. However, in recent years containers and swap bodies accounted for a growing percentage of rail tonne-km. Such percentage importance seems to have stabilised in the 2013-2015 period.

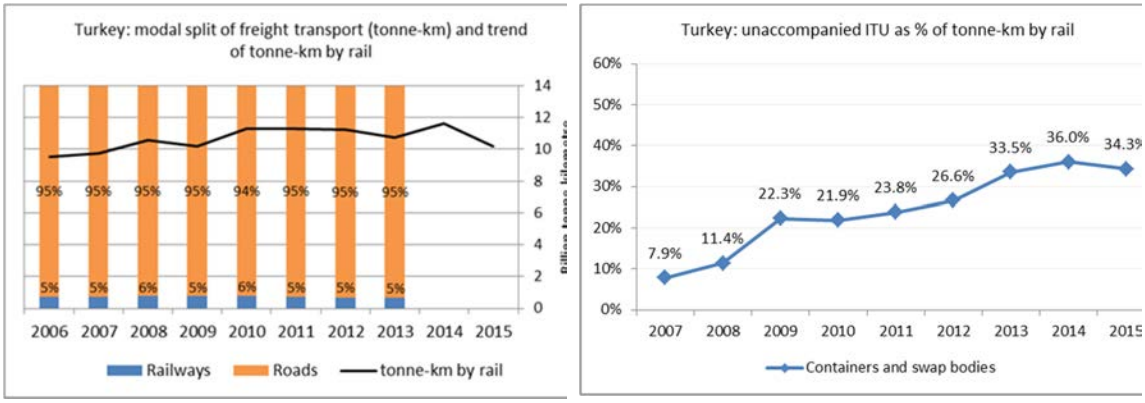


Figure 22. Turkey: modal split of freight transport and trend of freight tonne-km by rail (left); trends of unaccompanied intermodal transport (right). (Both charts are elaborations on Eurostat data).

2.2.4 THE EURASIAN ECONOMIC UNION

This study was unable to locate data on containerization for each of the Eurasian Economic Union (EAEU) countries, therefore this section includes the trends of rail transport for the Russian Federation and Kazakhstan, which are the two largest rail transport markets of the EAEU in terms of tonne-km and are also generally significant. In the Russian Federation, the very large and steady share of tonne-km by rail is accompanied by an increase in tonne-km by rail. UNECE data show, instead, an increasing trend for the tonne-km by rail in Kazakhstan except for 2013, the last year for which data are available. Belarus railways recorded an increasing number of cargo tonne-km between 2009 and 2012, but the last data point, which concerns 2013, shows a decrease. On a much smaller scale, Armenia is experiencing a sustained decrease in rail tonne-km and share. Kyrgyzstan, again on a much smaller scale than the Russian Federation or Kazakhstan, shows an increase in tonne-km by rail and rail share.

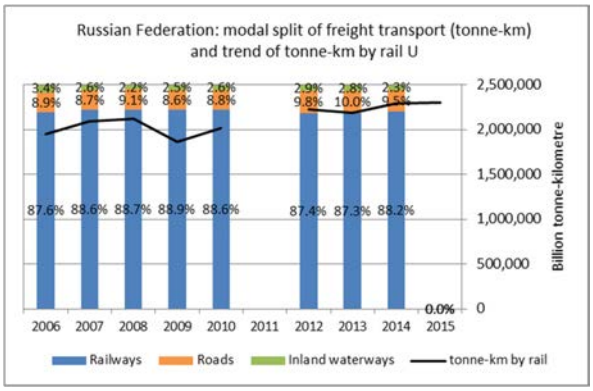


Figure 23. Russian Federation modal split of freight transport and trend of freight tonne-km by rail (elaborations on UNECE data).

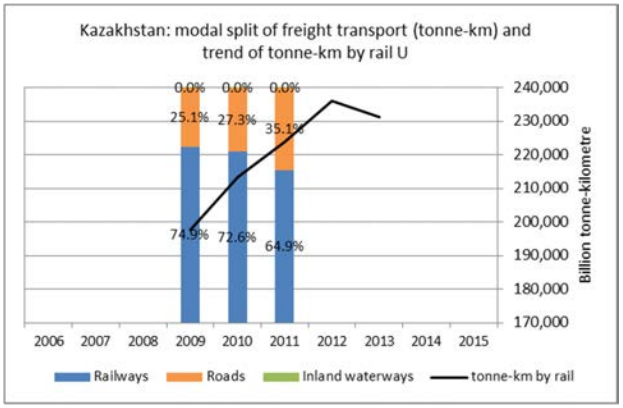


Figure 24. Kazakhstan: modal split of freight transport and trend of freight tonne-km by rail (elaborations on UNECE data).

2.2.5 OTHER EURO-ASIAN UNECE COUNTRIES

Data in Figure 25 for Azerbaijan reveal a decreasing but still significant rail share and a stable, although comparatively small, performance of rail cargo. The left chart in Figure 25 indicates a decreasing trend of number of TEUs transported by rail starting 2012, which seems to have stabilised over the past couple of years.

The large absolute figures of rail traffic in Georgia (Figure 26) show a steady decrease following 2010-2012 accompanied by a decrease in rail share and in the number of TEUs transported per year.

The comparatively small numbers of tonne-km and TEUs transported in Moldova (Figure 27) show a recently decreasing trend, which goes also together with a decreasing rail share.

As for Ukraine Figure 28 depicts a slightly decreasing trend in tonne-km by rail with a very high and stable share of rail cargo performance and a markedly increasing trend of TEUs transported by rail.

No intermodal data were found for Tajikistan and Uzbekistan. Judging from the limited number of data points available for recent years from the UNECE data base, tonne-km on Tajikistan railways are decreasing whereas tonne-km on Uzbekistan railways show a stable trend.

This study was unable to locate data on railway traffic or containerization for Turkmenistan.

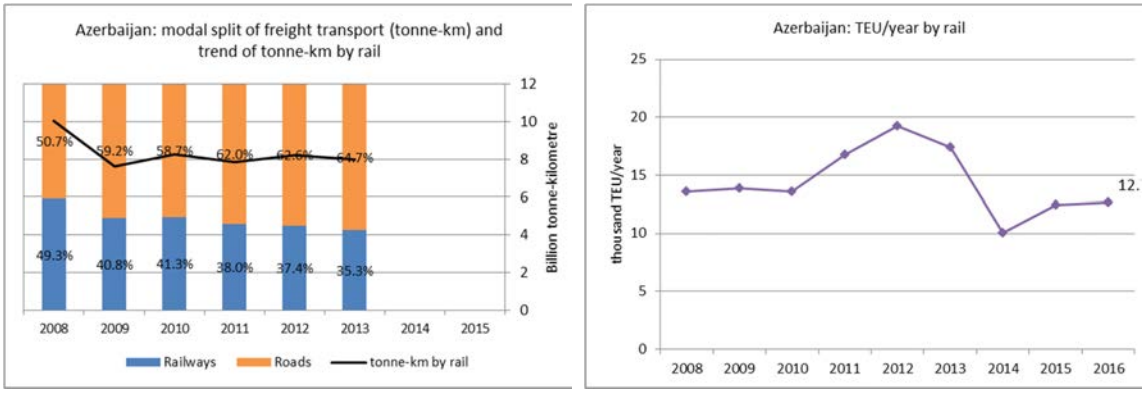


Figure 25. Azerbaijan: modal split of freight transport and trend of tonne-km by rail (picture on the left); TEU/year by rail (picture on the right) (both pictures elaboration on OECD data).

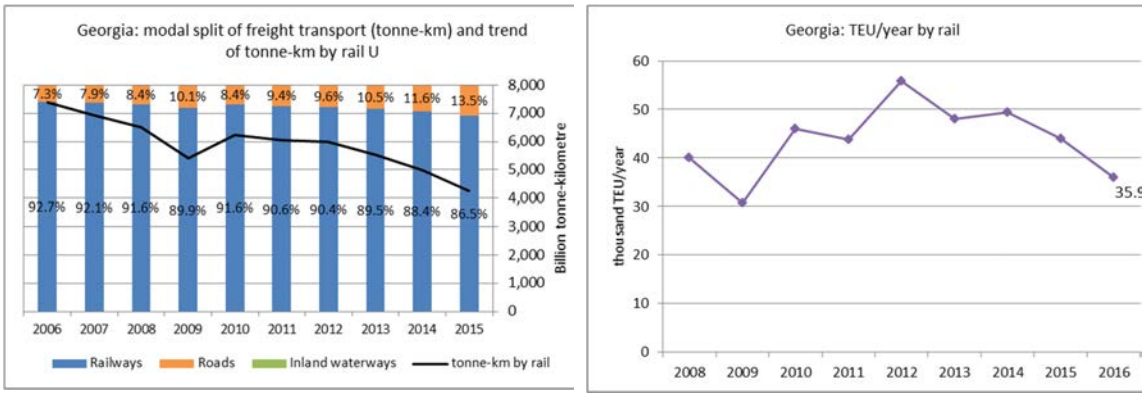


Figure 26. Georgia: modal split of freight transport and trend of tonne-km by rail (picture on the left); TEU/year by rail (picture on the right) (chart on the left; elaboration on UNECE data; chart on the right elaboration on OECD data).

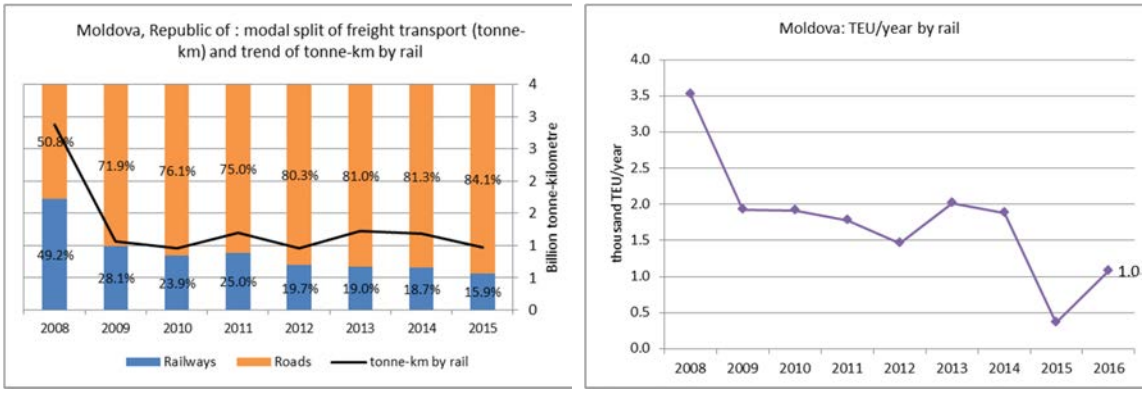


Figure 27. Moldova: modal split of freight transport and trend of tonne-km by rail (picture on the left); TEU/year by rail (picture on the right) (both pictures elaboration on OECD data). NB no data on inland waterways in Moldova was included in the OECD dataset so the modal split reported here is approximate and refers only to freight by road and rail.

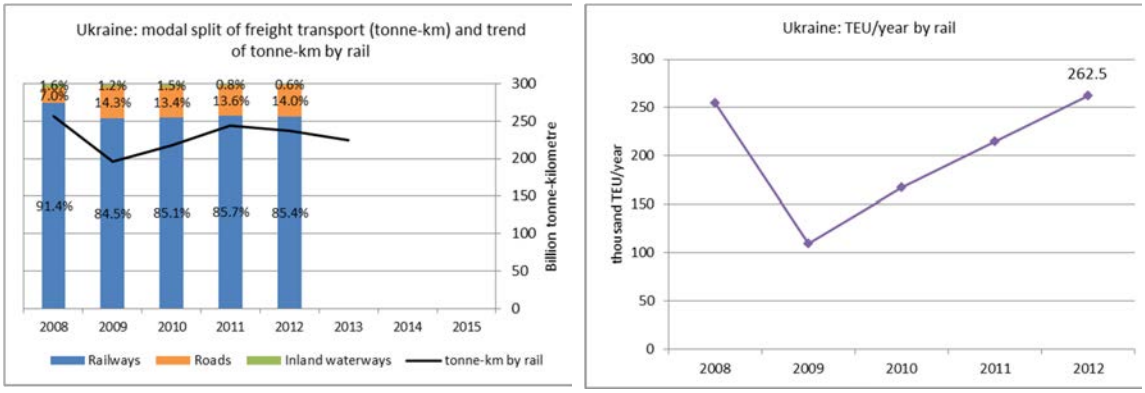


Figure 28. Ukraine: modal split of freight transport and trend of tonne-km by rail (picture on the left) and TEU/year by rail (picture on the right) (both pictures elaboration on OECD data).

2.2.6 ISRAEL

Data for Israel do not allow to assess the modal split by rail. However, the national statistics provide the trends of tonne-km by rail and the percentage of such tonne-km that may be attributed to container transport (see Figure 29, left). These show an increasing volume of rail freight and rather stable number of container tonne-km by rail, which result in a decreasing percentage of tonne-km travelled by containers by rail. The data about TEUs by rail shows a similar trend with the number of TEUs stable over the past few years, after an increase between 2009 and 2012 (see Figure 29, right).

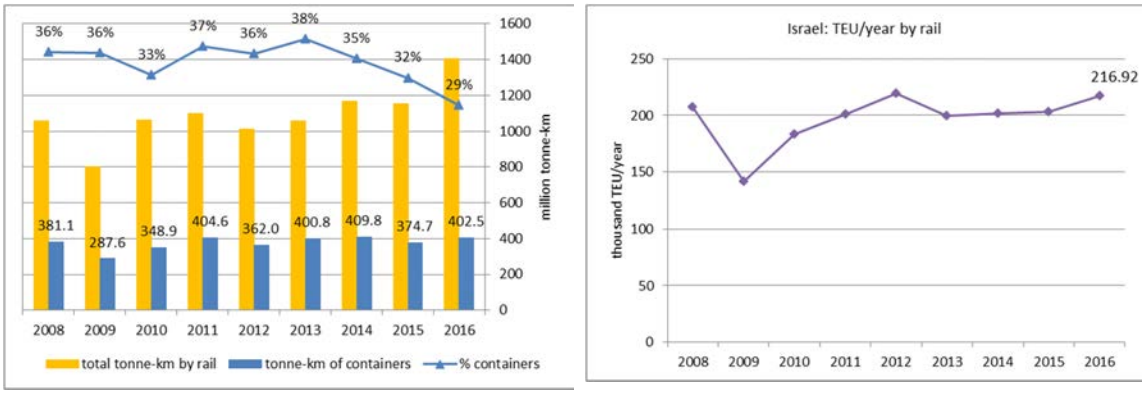


Figure 29. Israel: on the left, freight tonne-km by rail and containerized freight share (elaboration on data by Israel Central Bureau of Statistics); on the right, evolution of TEUs transported by rail per year (elaboration on OECD data).

2.2.7 CANADA AND THE UNITED STATES OF AMERICA

Both Canada and the United States of America are experiencing increasing trends of intermodal transport by rail. The share of rail in tonne-km in Canada is stable over the past years, while the number of tonne-km by rail is increasing steadily (Figure 30, chart on the left). A similar trend of steady increase is revealed when depicting the number of TEU/year transported by rail as in Figure 30 (chart on the right).

Also, the United States of America show a steady share of rail cargo transport with the trend of tonne-km by rail clearly increasing after a low point in 2009 (see Figure 31, chart on the left). Data on intermodal tonne-km display a constant growth after 2009, which seems to have stabilised after 2014. A more detailed analysis, performed in Mayo (2017), reveals that more than 90 per cent of intermodal units transported by rail in 2016 were containers, the remainder being semitrailers. The current large share of containers over semitrailers is the result of a constant increasing trend, which started in the 1990s.

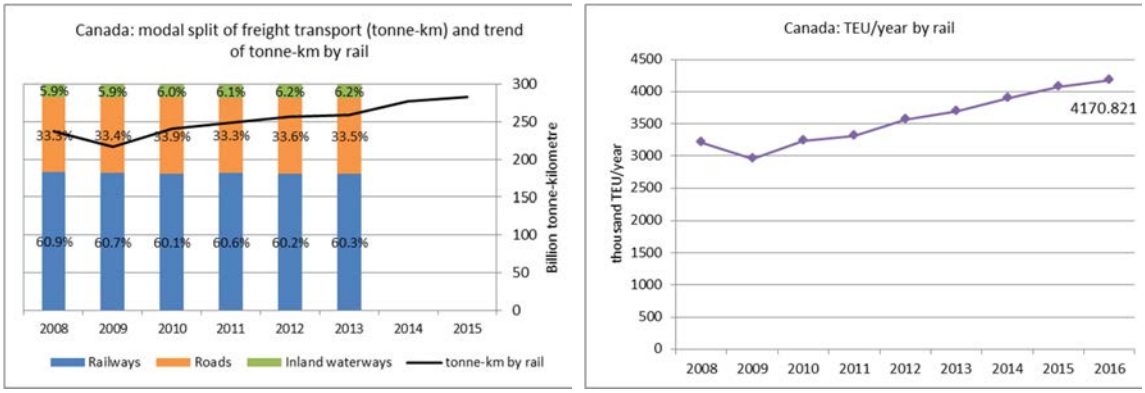


Figure 30. Canada: modal split of freight transport and trend of tonne-km by rail (picture on the left); TEU/year by rail (picture on the right) (both pictures elaboration on OECD data).

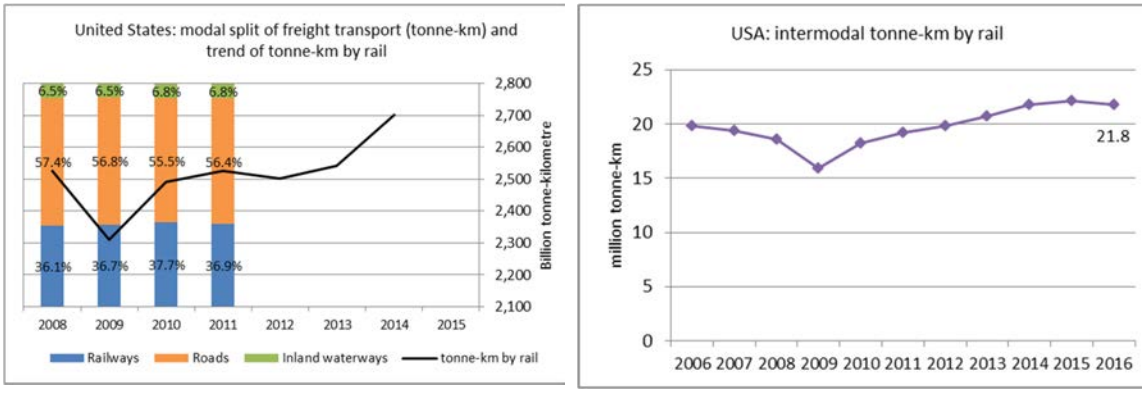


Figure 31. USA: modal split of freight transport and trend of tonne-km by rail (picture on the left) and intermodal tonne-km by rail, comprising containers and semitrailers (picture on the right) (the two pictures are not immediately comparable as they are from two different sources: picture on the left elaboration of OECD data; picture on the right elaboration of data from ALFRED, St. Louis Fed's Economic Research Division).

2.3 CASE STUDIES AND GOOD PRACTICES

2.3.1 EURASIAN CORRIDORS

Euro-Asian rail corridors linking China and Europe are in part established and in part being developed an increasing number of China-Europe container services are entering into operation, even though often only on demand rather than as regular services. Traffic development may be ascribed to the growth in the economies of several Asian countries and follows from the Chinese effort to advance the One Route One Belt (OBOR) initiative as well as from other governments' investments in infrastructure such those of Russia in the eastern part of the country,[1] the recent infrastructure development in Kazakhstan, as well as the government investment towards infrastructure in Iran and Turkey.

Following Galushko (2016) there are two main routes between China and Europe:

1. The route through Russia based on the Trans-Siberian mail line with the following branches:

- Trans-Sib — Trans-Kazakh route;
- Trans-Sib — Trans-Mongolian route;
- Trans-Sib — Trans-Manchurian route.

Although the Trans-Sib — Trans-Kazakh route is established as the one used by most container trains, also thanks to operational quality, different routes are best suited to access different parts of China.

2. The route through Pakistan, Iran and Turkey with extensions to China to the east and Europe to the West, which is being developed and needs investments in terms of lines and terminals. The key development that made possible the continuation of the route from Turkey to the EU is the opening of the Marmaray rail tunnel in 2013.

The Trans-Siberian route is used to carry much Russian internal traffic and provides the link for traffic between China and Russia, both containerised and bulk. It also links much of Russia with its far-Eastern ports of Vladivostok and Vostochny. The Coordinating Council on Trans-Siberian Transportation (CCTT)) indicates in 2017 that the Trans-Siberian main line is currently capable of transporting up to 100 million tons of cargo per year including up to 250,000 – 300,000 TEUs of international transit containers. The CCTT expects that in the future the capacity of the Trans-Siberian main line in terms of international transit containers will reach 1 million TEUs per year. Figure 32 displays the evolution of container cargo transport on the Trans-Siberian main line.

[1] See also the discussion in section 4.1.2.

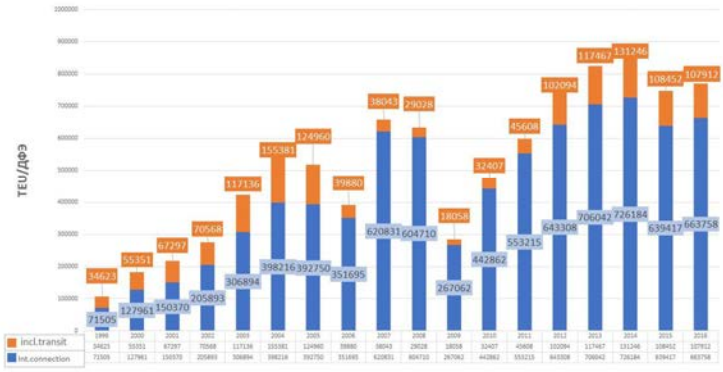


Figure 32. Evolution of container cargo transport on the Trans-Siberian main line (Source: CCTT, 2017).

Roland Berger (2017) observed a remarkable increase in overall rail container traffic between China and Europe and expected the rise to continue: some 25,000 TEUs were transported in 2014 along Eurasian links, which increased substantially to 145,000 in 2016. A potential 640,00 TEUs are forecasted in 2027. Still according to Roland Berger (2017), this would entail 7,800 trains in 2020 as compared to 308 in 2014. A part of the containers shipped by train on Euro-Asian routes would be shifted from sea transport, but the rise in freight transport should also result from the industrialization of the internal areas of China. Notwithstanding the important increase, containerised rail cargo still accounts for 1 per cent of the total Euro-Asian traffic, with almost all the remainder carried out by seagoing vessels.

Rail transport affords much lower transit times between China and Europe than maritime transport, it has become more reliable, but costs three to four times more. Roland Berger (2017) notes that an issue with meeting market needs in terms of prices is the flexibility of tariffs offered by maritime transport, which are not available for the rail links. This even tough rail fares are contained since, at present, railway transport is subsidised by the Chinese government through subsidies to the logistic platforms that order the intermodal services.

In general, according to Roland Berger (2017) and Galushko (2016) some positive points of recent developments concerning intermodal rail transport along the Euro-Asian corridor (comprising the Trans-Siberian mail line) include:

- The reductions in transit time and the increased punctuality;
- The increase in the number of origins and destination terminals in both China and Europe;
- The risks of theft and damage lower than in maritime transport;
- The use of the CIM-SMGS common consignment note and the Eurasian customs union; both have been important traffic facilitation elements. At present the CIM-SMGS common consignment note may be used along most of the Euro-Asian route comprising the Trans-Siberian mail line, except in China.

Roland Berger (2017) notes that currently the northern routes are the fastest and offer sufficient capacity whereas the southern routes require significant infrastructure investments. They also forecast a continuation of the role of major China-Europe corridor for the northern route, also since it provides easier access to most European countries. Southern routes in 2027 are forecasted to carry

19,000 TEUs/year that is 3 per cent of the Eurasian rail traffic. In fact, these routes are important as access links between China and Asian regional markets rather than for China-Europe traffic. However, the same links may have a role in opening rail access to those regional markets to Europe.

To realise the full potential of the Euro-Asian routes a number of issues need to be sorted. According to Roland Berger (2017) and Galushko (2016) these are:

- Balance of eastward and westward flows;
- Infrastructure upgrades concerning for instance solving issues with single track lines and coordination in terms of signalling. Galushko (2016) notes a case in which this arises as a new point: signalling technology to Russian standards is used in the Russian Federation and Kazakhstan while Mongolia is replacing that signalling technology with ERTMS;
- Reliability of transit times and information sharing between railways and customers need to improve. The former concerns particularly transit on European railway links where reliability is lowered by changes of traction, priority to passenger trains, and track possessions for maintenance. The need for better information sharing includes reliable forecasts of expected time of arrival;
- Efficiency gains;
- Bottlenecks at key transfer points. These include terminal facilities where containers are transhipped. This operation is required at the change between standard gauge and wide gauge (in Brest, Belarus, to name one of the key border points, which is forecast to remain the most important one) and at the border between the Russian Federation or Mongolia and China, where tracks are laid with standard gauge;
- Waiting times and processes at borders. Galushko (2016) reports that the Coordinating Council for Trans-Siberian Transportation indicates as top reasons for cargo detentions at borders the incorrect carriage and commercial documents, followed mainly by other procedural issues;
- Availability of wagons, whose shortage follows the assignment of wagon pools formerly owned by Russian railways to separate rolling stock leasing companies and has made the use and return of wagons more expensive and time critical, also resulting in empty returns;
- Electronic data and document exchange, whose regular use can improve freight train operations significantly (Islam et al 2014, Galushko, 2016);
- Customs and bureaucracy, which are issues along the southern route.

Galushko (2016) points out that many problems are due to lack of coordination and organisation of transports especially at borders and inadequate information exchange among railways.

2.3.2 RAIL FREIGHT CORRIDORS IN THE EU

Rail Freight Corridors in the EU are coordination structures to obtain market oriented freight corridors based on the key European rail transport routes and have been set up following the provisions of the EU Regulation 913/2010 “concerning a European rail network for competitive freight”. There are nine Rail Freight Corridors (RFCs), six set up by November 2013 while the other three set up in November 2015. An overview of transport corridors as of 2017 is reported in Figure 33.

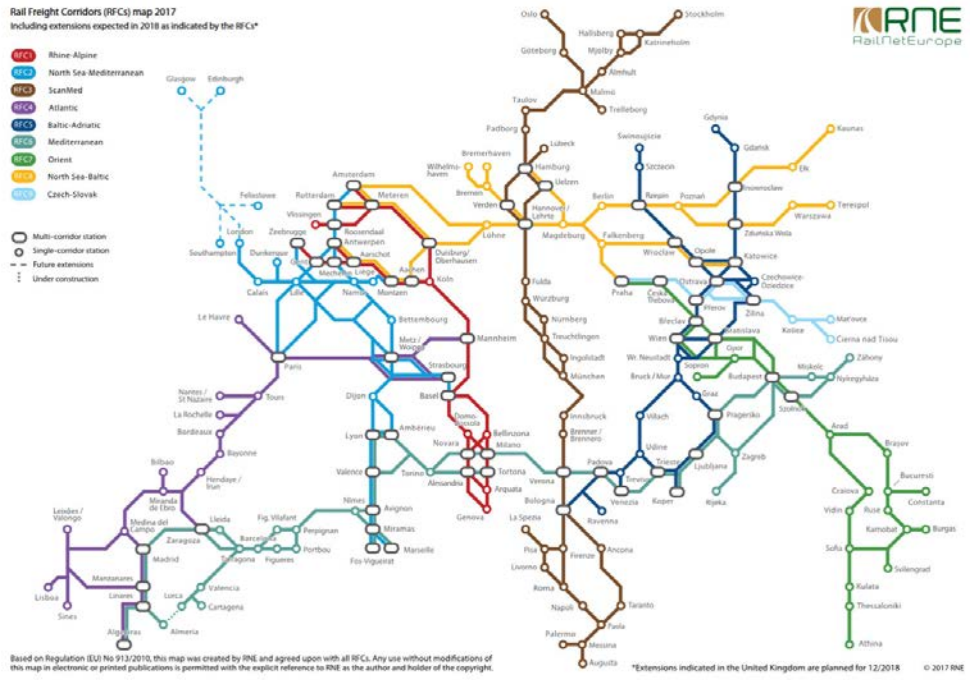


Figure 33. Map of the Rail Freight Corridors as of 2017(Source: RNE http://www.rne.eu/rneinhalt/uploads/RFC-MAP-2017.pdf).

Rail Freight Corridors (RFCs) concern all rail freight transport but they are critical for intermodal transport since they provide governance, coordinate investments and capacity allocation along major intermodal transport routes, relevant within Europe, as well as between ports and their hinterlands, and in connection with Eurasian corridors.

In fact, UIC (2017), characterised the major European intermodal freight lanes which, as it may be readily seen, concur with the RFCs. For instance, the top five intermodal transport freight lanes in 2015 were:

- Germany - Italy, which is supported by RFC 1 Rhine Alpine and RFC 3 Scan Med;
- Germany - Netherlands supported by RFC 1 Rhine Alpine and RFC3 Scan Med;
- Germany - Czech Republic, along RFC 8 North Sea Baltic;
- Belgium - Italy, whose traffic may flow along RFC 1 Rhine Alpine and, partly, along RFC2 North Sea Mediterranean;
- Czech Republic - Slovakia, supported by RFC7 Orient and RFC 9 Czech-Slovak.

The overall aim of Rail Freight Corridors is to optimise the use of the densely used European rail network, where freight operations need to account also for intense passenger traffic on the same tracks, ensure reliability and quality for freight transport, allow freight trains to easily pass from one national network to the other and coordinate the actions of infrastructure managers in terms of investments and of capacity allocation, also for maintenance. RFCs also aim to ensure effective links to other modes, thus facilitating intermodal transport.

RFCs are set within a framework comprising the trans-European Transport Network (TEN-T) and the European Railway Traffic Management System (ERTMS) corridors, to which they are integrated.[2] In particular, TEN-T core network corridors are multimodal and concern both passenger and freight transport whereas RFCs are focusing on rail freight and the provision and allocation of capacity. RFCs may differ from Core Network Corridors where they follow routes more appropriate for freight traffic, for instance avoiding urban nodes.

The governance structure of each RFC comprises an executive board, including representatives of the Member States concerned, and a management board whose members are representatives of the infrastructure managers and capacity allocation bodies concerned. The management board ensures the involvement of corridor users by fostering their participation in the Railway Advisory group, dedicated to railway undertakings operating on the corridor, and in the Terminal Advisory Group, open to representatives of terminals and ports along the corridor. The management board is also tasked with drawing up the implementation plan for the corridor which includes a description of the infrastructure, of its bottlenecks and of the measures foreseen to improve rail freight, along with an investment plan comprising an implementation schedule, all of which supported by the result of a corridor transport market study. Those elements are underpinned by the objectives of the freight corridor, which are also included in the implementation plan and indicate the target performance in terms of quality of service and capacity. Investments in infrastructure are typically directed to solve bottlenecks but should also aim to obtain a harmonized network able to accommodate 740 m long freight trains on electrified lines equipped with ERTMS, allowing speeds of up to 100 km/h and axle loads up to 22.5 tonne. Efforts are also directed to harmonisation of operational rules, interoperability, and coordinated traffic management (Troche, 2015).

As for allocation of capacity, each RFC has a Corridor One Stop Shop (C-OSS) intended to deal with path requests for international services, which provides pre-arranged paths (prepared by the infrastructure managers) intended for freight traffic crossing at least one border. The C-OSS manages also reserve capacity, which is earmarked for freight trains and remains available as late as possible in the timetable definitions aiming for increased responsiveness to the needs of rail freight transport.

RFCs are still developing as operational structures. In fact, UIC (2014) at the end of a project on efficient cross corridor organisation noted the need for better cooperation between infrastructure managers and between them and the railway undertakings, as well as the necessity of cross border harmonisation of technical, operational and administrative processes. UIC (2014) also flagged up the lack of statutory requirements for a coordination across corridors.

Such issues are still current as voiced by the statement issued recently by European Rail Freight Association (ERFA), *Netzwerk Europäischer Eisenbahnen* (NEE) and Internatinal Union for Road Rail Combined Transport (UIRR) (2017) taking stock of the situation after the Rastatt incident that interrupted the Rhine Valley freight route for seven weeks in the summer of 2017. The incident stressed the work that still needs to be carried out to achieve effective corridor and network wide coordination. As freight operators had to use diversions they encountered issues due to additional changes of locomotives and drivers and lack of additional traction to support the number of trains initially scheduled on the Rhine-Alpine corridor. ERFA, NEE and UIRR (2017) call for international rail traffic management on the RFCs, as they see the RFC governance as not adequate to overcome the national focus of infrastructure managers for connections among corridors that need to be developed

[2] The harmonization of the alignments of the TEN-T Core Network Corridors and Rail Freight Corridors is stipulated in EU Regulation 1316/2013 establishing the Connecting Europe Facility.

as actually integrated, interchangeable transport systems with harmonised train parameters, as well as for contingency plans.

2.3.4 INTERMODAL RAILWAY TRANSPORT AS A TOOL OF THE SWISS TRANSPORT POLICY

Switzerland is an Alpine country crossed by large flows of freight transports. This is also since it is located along the Rhine-Alpine corridor (the Rotterdam Genoa corridor) which accommodates significant freight flows that are either directed or originated in Switzerland or travel through it, from the Northern part of Europe to Italy or in the opposite direction. Article 84 of the Swiss Constitution affirms the need to protect the Alps, their environment and their population, from the negative effects of transport. The same article indicates that the policy to protect the Alps is based on shifting freight traffic from road to rail. Unaccompanied and accompanied combined transport services are key elements of such policy. To support them the Swiss Federation subsidises the combined transport services that are not economically viable, and provides financial support for terminals as well as co-funding for private sidings. Unaccompanied transport services are intended as the main recipient of subsidies. Subsidies for intermodal services are attributed following a bidding procedure whereby combined rail transport companies submit a programme of operations and a cost plan. At present, subsidies for intermodal transport across the Alps will be sustained until 2023.

A number of intermodal services are available to trucks crossing the Alps and Switzerland. Trucks that do not use the intermodal transport options are subject to the Heavy Goods Vehicles Charge, introduced in 2001 according to the “polluter pays” principle. Intermodal rail subsidies and fees for truck traffic are set by the Swiss law on shifting freight traffic from road to rail, issued in 1994 following the article of the constitution mentioned above. The revenues of the Heavy Goods Vehicles Charge are used to provide part of the financing required by the AlpTransit project. This is a major project centred around the construction and the operation of three railway base tunnels: the Lötschberg tunnel, along the Simplon axis, and the Götthard and Ceneri base tunnels. The Lötschberg and Götthard base tunnels are already in operation, although at present the first only partly single track, and the Ceneri base tunnel, set along the Götthard axis will be opened in 2020. Benefits of the AlpTransit project will concern all freight and passenger transport. In particular, AlpTransit provides railway routes with slopes and curves similar to those of railways in the plains, designed to allow 2000 tonnes freight trains to cross the Alps with a single locomotive.

Switzerland is also running a project to upgrade infrastructure to allow cross Alpine rail transport of four-metre corner height semitrailers and trucks, which account for 60 per cent of current traffic and are forecast to increase. Currently 4-metre corner high semitrailers can be transported by train along the Basel Domodossola route (the Lötschberg route) and further into Germany or Italy but cannot be carried on trains on the Basel-Chiasso route (the Gotthard axis). Present and planned works are intended to upgrade the loading gauge along the approach routes to the Gotthard in both Switzerland and Italy. Completion of works is foreseen in 2020.

The Swiss law on shifting freight traffic from road to rail sets a target for the maximum number of trucks crossing the Alps on the roads each year. An initial target was not achieved and was deemed too ambitious. The current target sets the maximum of 650,000 trucks a year in 2018, two years after the opening of the Gotthard base tunnel. The set of policies and projects carried out thus far has already brought about a reduction in road transport: the number of trucks through the Alps decreased by 30 per cent between 2000 and 2014 (FOT, 2016a) and it is estimated that about 700,000 additional

trucks per year would travel through Switzerland without the measures to shift freight to rail. The policies to shift heavy goods vehicles traffic to rail have resulted in a trend of steady increase of unaccompanied and accompanied combined transport (with the exception of 2009 and 2012) carried by rail on Alpine routes, as charted in figure 34.

To further support shifting freight vehicles to rail, Swiss law provides for the establishment of an Alpine Crossing Exchange whereby a quota of transit rights for trucks would be auctioned to operators. The exchange is not in operation since it would not be accepted by Switzerland's neighbours.

On the rolling motorway services, it is worth noting that the travel time may be used for the statutory rest periods of drivers to take place on the trains: the Freiburg im Breisgau (DE) – Novara (IT) journey requires 10 hours. Moreover, they allow to cross Switzerland during Sundays or at night time, when truck traffic is banned.

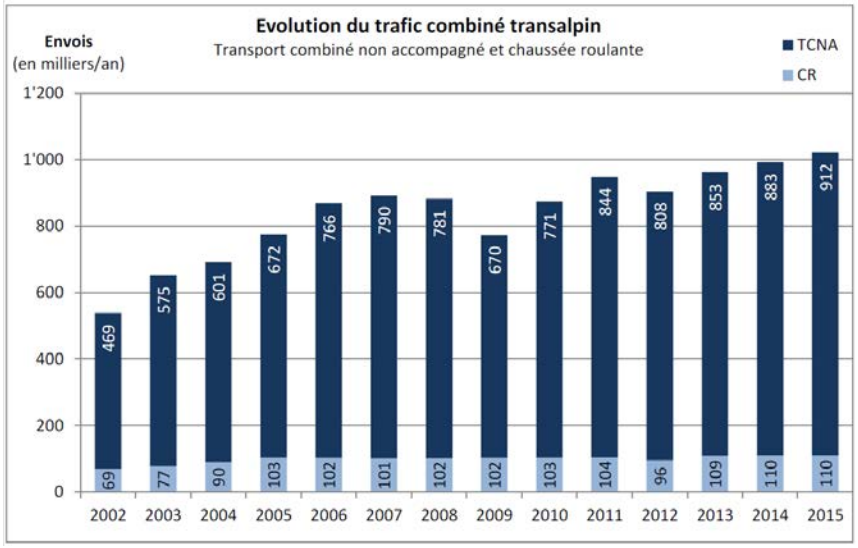


Figure 34. Number of trucks transport across the Swiss Alps either as unaccompanied transport (TCNA) or as accompanied transport ("rolling motorway", CR). Figures in thousand per year. (Source: Swiss Federal Office of Transport).

2.3.5 ACCOMPANIED INTERMODAL TRUCK TRANSPORT VIA THE CHANNEL TUNNEL[3]

A further case of accompanied intermodal transport of tractors with semitrailers or trucks is the shuttle service along the Channel Tunnel. The shuttles link the terminal of Coquelles in France and the terminal of Folkestone in the UK. Both terminals are directly linked to the motorway. Each shuttle train can accommodate up to 30 or 32 trucks[4] or tractors with trailers and has a coach where drivers seat during the journey, which lasts 35 minutes. All including end to end journey time is 90 minutes and compares with 210 via ferry (EY, 2016). The service started in 1994 and flows of vehicles and goods along the tunnel are continuously increasing as shown in figure 35, notwithstanding the temporary reduction caused in 2013 by an immigration crisis. Transport of goods along the Channel Tunnel is carried out also with conventional freight trains, although the majority of cargo is carried out with the shuttles.

[3] This section is based on the information provided on the webpage of the Getlink group, Getlink (2017), on EY (2016), and UIC (2017a).

[4] Depending on the type of shuttle.

UIC (2017a) notes that the shuttle service along the Channel Tunnel is the accompanied intermodal transport service carrying the largest flows in Europe. The company running the shuttles is increasing the fleet so as to increase the departures of shuttles to 8 per hour at peak time while at present up to 7 departures per hour are available at peak times.

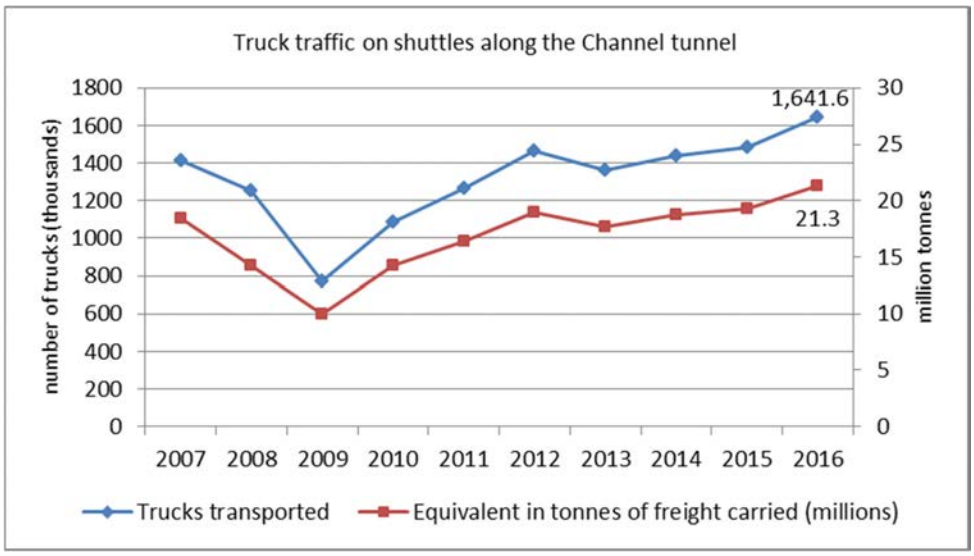


Figure 35. Traffic of trucks on the Channel tunnel shuttles, both directions (elaboration on data by Getlink).

3. ANALYSIS OF THE IMPORTANCE OF TRANSPORT DOCUMENTS COMPUTERIZATION FOR INTERMODAL TRANSPORT AS WELL AS OF TRANSPORT DOCUMENTS ALREADY OPERATING ELECTRONICALLY

3.1 OPPORTUNITIES AND CHALLENGES OF TRANSPORT DOCUMENTS COMPUTERIZATION

Transport documents are the documents referring to the contract of carriage such as the consignment notes, CMR for international road transport or CIM, SMGS, CIM/SMGS for railway transport, or the customs documents such as the TIR carnets. Their computerisation is being carried out or sought by several parties, on account of the benefits that may be obtained comprising time, costs and efficiency gains. At the same time a number of issues exists that threaten the effective development of such documents and their wider application.

Recognised advantages to using electronic transport documents include the following:

- Reductions of costs for document production and handling as well as reductions of costs and space for storing the documents;
- Reductions of times required for document production, operation and storage. As transport documents go through their life cycle, data could be exchanged in real time with e-documents being processed as transport and administrative steps occur, rather than when the appropriate offices may process them;
- Reductions of costs and times for other administrative operations related to transport operations, such as booking and billing;
- Better data flow with secure document exchange and no need for manual hand over of papers.
- Better data quality with the possibility to re-use data without the need to re-enter them, therefore avoiding also errors and discrepancies. The possibility of real-time checks on data acceptability as they are being entered or as the document is submitted is also a step toward better data quality;
- Overcoming limitations typical of paper documents such as the language (only very few languages may be used on a form to clarify the content) that may be tailored to the users, thus avoiding misunderstandings and incorrect data provision;
- Possibility to develop intermodal documents as the development of e-transport documents is in terms of data and collections of data, rather than of documents;
- Traceability, which would complement the other advantages by giving visibility to the progress of an administrative procedure linked to a transport or to the transport itself;
- Reduction in paper use, with environmental benefits. BLG and IRU (2017a) estimate that using e-CMR in Europe would lead to saving 135 tonnes of wood each year;
- Improved safety due to the possibility of real time sharing of data with emergency services, allowing for appropriate responses in case of incident, also in case of transports of dangerous goods.

- Increased security, due to higher efficiency of controls based on electronic secure information;
- Possible integration with other services, such as customs, facilitated by data standardisation thanks to ready integration with single window systems.

In general, it is reckoned that electronic versions of transport documents would facilitate trade, nationally and internationally.

The advantages indicated above are clear from the examples of current practice and pilots reported below. For instance, advantages on security and controls are apparent in the case TIR Electronic Pre-Declarations which is current practice (see section 3.2.2).

Indeed, some freight transport stakeholders have already switched to electronic interaction whenever possible and whether that involves or not transport documents: see, for instance, the focus on the CESAR platform (Co-operative System for Advance Information Redistribution) in section 3.2.3, in which intermodal operators and customers interact regularly with EDI and have therefore turned their booking, tracing and invoicing systems to direct exchange of data between their own systems. This has increased the responsiveness of businesses as for operations and booking procedures.

However, the uptake of e-documents has so far been limited even when the technology and the systems are in place, as it is the case with e-CMR or e-TIR or with the long established e-CIM.

At present there are a number of issues that hamper the development of e-transport documents:

- Legal or technical concerns about authenticity and integrity and therefore protection from fraud, as it is the case with road side checks of e-CMR documents;
- Perception of higher reliability of paper documents;
- National legislation in some countries, for instance requiring signatures on paper rather than allowing electronic signatures;
- Presence of several standards and concerns about their interoperability;
- Issues with access to data by parties other than those signing the contracts, as it is the case with e-CMR and the access by state authorities.

UIC (2017a) consulted intermodal operators active in more than 30 countries[5] on several points concerning the digitalization of railways, including e-documents. The vast majority of those operators sees “the implementation of standardised digital solutions as an essential facility for the future development” of intermodal transport and believe that it might increase the competitiveness of intermodal transport.

The UIC (2017a) survey also found out that -according to operators- digital solutions in combined transport are not implemented to a sufficient level, although many of them think that such issue does not involve their own company, and that the majority of interviewees thinks that digitalisation does not involve risks for market development or costs.

As a side note it is It is worth mentioning that the discourse on e-documents in intermodal transport is often associated with the wider computerisation of intermodal transport and the possibility to track the shipments in real time, especially on the rail leg. Tracking would enable better quality of services, with visibility to customers, and better fleet management and maintenance. Tracking is an issue particularly relevant in rail since availability of trains and cargo location data is piecemeal and has different owners, while such an information is critical to plan operations at terminals, organise road

[5] UIRR operators are active in Europe as well as Turkey and Russia.

haulage and, as just mentioned, for a transparent service to customers. Projects to enable tracking of trains and loads are not discussed here but are mentioned in chapter 4 as part of some case studies.

The pilots described in this chapter (e-CMR, e-TIR) as well as the further uptake of existing systems (e-CIM) should allow testing or demonstrating ways to overcome the obstacles to e-document implementation and make the advantages concrete and noticeable. Also, the platform for stakeholders set up by the European Commission to take stock of the current situation in the EU should indicate the way forward for e-freight, which includes e-transport documents.

Ultimately the equivalence of paper and electronic transport documents should be established effectively by governments with a view to switching to paperless transport, so that acceptance and use may increase.

3.2 CURRENT INITIATIVES TOWARDS THE COMPUTERIZATION OF TRANSPORT DOCUMENTS

3.2.1 E-CMR PILOTS IN EUROPE

As noted by Kern (2017), the application of the e-CMR, the electronic version of the CMR consignment note (illustrated in 4.2.1), will bring transport cost reductions (with handling costs up to three to four times less expensive), faster administration and invoicing, and a reduction of delivery and reception discrepancies. Still Kern (2017) notes that using the e-CMR would increase data accuracy and would be linked to real time information on progress of shipments, including proof of delivery. Additionally, the e-CMR can be linked to the European system e-call that calls automatically the emergency services in case a truck is involved in a road accident, thus providing information useful for appropriate intervention especially in case of dangerous goods. However, as noted below, there are concerns about the usability of e-CMR for road-side controls and e-CMR is neither regularly nor widely used, so far.

Testing the feasibility of e-CMR in practical applications is the object of pilot projects between France and Spain, in Belgium — for national transport operations - , and in Benelux — for transport between the three countries.

The pilot concerning e-CMR transports between Spain and France started on 19 January 2017. As of October 2017, 45 companies were using e-CMR between the two countries (Kern, 2017). The application is based on the e-CMR software provided by the Dutch company TransFollow which is cooperating with IRU on e-CMR development. TransFollow has been set up by Dutch Association for Logistics and Transport (EVO), the Dutch knowledge centre on transport, and by TLN, the Dutch association of transport and logistics operators.

According to the information supplied by the *Service public fédéral Mobilité et Transports* (2017), on 1 December 2017 a pilot project is starting for the use of e-CMR in transports of goods inside Benelux, with a foreseen duration of 3 years. Operators will be able to obtain the software to use e-CMR from nine authorised companies until 31 august 2018, while pilot transports accompanied by e-CMR will be possible starting 1 March 2018. According to the *Comité de Ministres Benelux* (2017) the motivation for the pilot project reported is the need to ascertain the actual possibility to use the e-CMR, seen on a screen or printed on a vehicle, by the Belgian public authorities. The same source indicates that Dutch public authorities do not see the use of e-CMR for controls as an issue. At the same time a national

Belgian pilot project is to assess the use of e-CMR for national transport. To enable the project the Belgian Ministry of transport will have access to the e-CMR database. The first part of the pilot will concern observing the functioning of the system; the second part will be used to fine-tune the rules whereas the third and final part of the pilot would concern expanding the system to other member States, which is foreseen to require access to e-CMR data by public authorities across countries (DTLF, 2016a).

DTLF (2016b) reports the regular use of e-CMR in Denmark with the system developed by the Danish Association of the road transport of goods (ITD) with 100 e-CMR used per day, but remarks the existence of issues about the trustworthiness of the e-CMR system and the interaction among parties.

3.2.2 CURRENTLY COMPUTERISED TIR PROCESSES[6]

TIR (*Transports Internationaux Routiers*) is a Convention that allows swift international transport of goods based on the checks carried out at the customs office of departure on the goods, on the integrity of the container or truck that carries them, and on the TIR carnet, the customs document which is also proof of existence of a guarantee for customs duties. Details on the Convention and on its current geographical scope are given in section 4.2.2 as an introduction to the ongoing e-TIR project, concerning the full computerization of the TIR procedures and the related pilots.

Presently, TIR carnets are paper documents consisting of several vouchers. Pending the development of the e-TIR project, a number of computerised procedures have been established by the IRU (International Road Union) which is responsible for the administration of TIR operations, including the distribution of TIR carnets, via its national associations.

To introduce the operations already computerised, it is useful to summarise some key steps of a TIR journey. A TIR journey starts when an authorised carrier asks the local IRU association to purchase a TIR carnet for an international transport of goods. Each carnet is valid only for a single journey. Once the local association has obtained the carnet and has given it to the carrier, the authorised truck is taken to the customs in the country of origin. After the controls and inspections that the customs deem required, customs officers seal the truck, stamp the carnet, remove a counterfoil from it, and hand the carnet back to the driver. At each customs stop, after checking the integrity of the seals and stamping the carnet, customs remove a counterfoil from the carnet. The removal of the counterfoil is the end of the part of the TIR operation concerning that customs office and must be communicated to IRU, which follows the lifecycle of the carnet. At the customs of the country of destination, once the integrity of the seal is checked again and finally the seal is broken, the driver of the truck is handed back the carnet which must be returned to the IRU national association. The latter, in turns, has to communicate to IRU that the carnet for the completed TIR journey has been returned.

The large number of TIR operations carried out each year (see Figure 36), the need for ever safer TIR procedures even with limited customs manpower, have led to the development of several portals that the actors involved may use to exchange information in electronic forms, as well as to re-use information that has already been entered at a previous step of TIR operation, without having to go through the time consuming and error-prone process of re-entering data again.

[6] The present section is based on IRU (2012), Ferreiro (2013), UNNExT (2014), Marinova *et al.* (2016), UNECE (2017a), IRU (2017a, 2017b).

Currently computerised TIR processes and portals include:

- AskTIRweb, a portal for local IRU associations. It is used to manage the lifecycle of TIR, from the request of the TIR carnet to the communication of its return at the end of the TIR journey. AskTIRweb is also used to manage operations such as claims and invalidations of carnets. It is used by more than fifty member associations of IRU in more than fifty countries. Its use is mandatory for all new TIR associations.
- TIR Electronic Pre-Declaration (TIR EPD). Pre-declaration is the transmission to the customs of the information on the cargo prepared for a TIR operation in advance of taking the vehicle laden with the goods for customs controls in the country of origin. TIR authorised parties carry out a TIR EPD via a web portal whose use is free of charge. Receiving information in advance allows the customs in the country of origin and the customs along the TIR journey to better risk manage TIR journeys. According to IRU (2017a), as of January 2017, TIR EPD has been implemented in 33 TIR operational countries. The use of TIR EPD is currently compulsory for freight shipments into the EU, the Eurasian Customs Union, Iran, and Ukraine.
  IRU is also advocating the establishment of Green Lanes for TIR operations with Electronic Pre-Declarations. This would be dedicated lanes at customs control allowing time savings to this kind of TIR transport thanks to the advance risk assessment that customs may perform.
- Safe TIR portal and Real-Time Safe TIR. These tools allow customs offices to enquiry about the validity of TIR carnets and to confirm the completion of a TIR transit or journey. In fact, Real-Time Safe TIR, sends automatically information about the termination of a TIR journey.

Additionally, UNECE maintains the International TIR Data Bank and Web service, which is used by customs and national IRU associations to access information such as authorised TIR operators as well as, since 2017, the register of customs sealing devices and customs stamps.

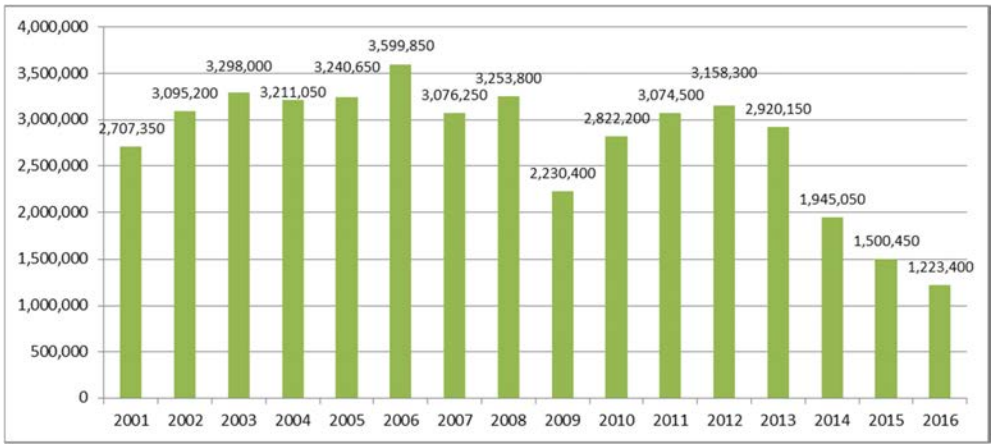


Figure 36. Total number of TIR carnet issued each year (elaboration on IRU data).

3.2.3 THE CESAR PLATFORM[7]

CESAR is included here as an example of interaction with customers by intermodal rail operators being already preferably in electronic form: e-booking and e-billing are daily practice also with direct interchange of information between the systems of the intermodal rail operators and their customers in one of several formats allowed (e.g. XML messages, text messages). Although this is also established practice at several operators and railway undertakings, the example of CESAR is noteworthy as it is the first example of an international cooperation by separate and competing operators.

CESAR's inception project was carried out with the coordination of the Union of combined Road-Rail Transport companies (UIRR) and with co-funding by the European Union and the Swiss Federal Office for Education and Sciences. In 2004 a company for the regular operation of CESAR and its further development was formed by the combined transport operators involved.

CESAR is a platform set up by six intermodal rail transport operators[8] to provide customers with a single portal from which they may access the timetables, the booking systems and the tracking and tracing systems of each combined transport operator (see Figure 37). In fact, the track and trace feature is the most used one among those available on the CESAR portal. This is so since CESAR collects information from all operators, performs quality checks and makes the data available to intermodal customers in real time so that road transport operations linked to each rail leg may be optimised.

Even though the portal allows working directly on the webpages, intermodal customers regularly use B2B EDI connections to exchange data directly between CESAR and their own systems.

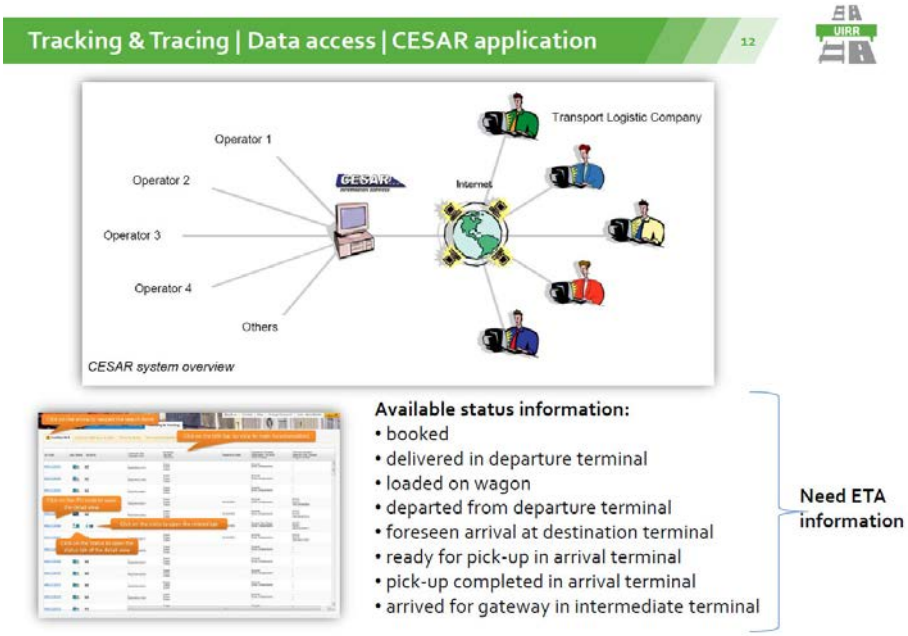


Figure 37. An overview of the CESAR system interfacing many customers with several combined transport operators via a single portal. The figure also lists the data currently available via web portal or EDI (Source: Feyen, 2017).

7 The present section is based on the CESAR website and the information therein, and Feyen, 2017.

8 Adriakombi, CEMAT, HUPAC, KombiVerkehr, Novatrans, Rail Cargo Austria.

3.2.4 HUPAC'S EDIGES SYSTEM AND FORMAT FOR DATA EXCHANGE[9]

EDIGES (EDI GOAL with External System) is a solution developed by HUPAC, an independent intermodal transport operator based in Switzerland, to interface its own transport and billing management system called GOAL with external systems. GOAL stands for Global Oriented Application for Logistics and is a long established HUPAC's own solution with several modules including e-booking, e-billing and real-time management of transport operations. The latter include the exchange of updates on the status and processes of intermodal transport units (among which booking, gate-in, loading, consignment note, ITU ready for pick-up) and of trains (with pieces of information such as closure of train and train composition at departure, train arrival). With EDIGES such functions have been made available across systems different from GOAL.

The standards used to exchange messages by EDIGES (in the form of XML messages) have been recently endorsed by UIRR as the European standard for EDI integration among intermodal transport operators. The choice was made in 2017 following the need to update the previous UIRR standard. In fact, the EDIGES format for data exchange has already been adopted by several operators.

Currently HUPAC exchanges data via EDIGES with several other transport operators such as 24 terminals, 15 rail undertakings, other combined transport operators, the systems of the Rotterdam and Amsterdam Port Authorities as well as 80 clients that use the system for e-booking and e-billing. With rail undertakings EDIGES is also used to exchange train compositions and e-consignment notes.

3.2.5 THE RAIL ELECTRONIC CONSIGNMENT NOTE E-CIM[10]

The use of electronic consignment notes (ECN) by railways that exchange vehicles within the COTIF system is foreseen by the Convention based on the functional equivalence of the paper and electronic documents. Legal and technical specifications are in place. However, implementation is limited, notwithstanding the requirements for railways based in the EU to comply with the TAF TSI,[11] which is intended to ensure interoperability of railway telematics systems and implies the implementation of ECN across EU railways.

As with other electronic systems, recognised advantages of rail ECNs comprise savings in costs and time, easy exchange and storage, with no need for manual exchange of train documents between train staff, no possibility to lose the note while it is used. Again, as with other systems, limits to the deployment of ECNs exist due to legal or technical concerns about authenticity and integrity and therefore protection from fraud. Additionally, in case of dangerous goods the electronic consignment note is not yet accepted and the paper version remain mandatory.

A first attempt at developing electronic rail documents was the DOCIMEL project (DOCument CIM Electronique), which started with CIT developing the principles for the e-CIM and ended in 1992 with the production of technical documentation. There was no immediate application as the project was

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9 This section is based on the information available on the HUPAC website, and on Croci (2015).

10 This section is based on Evtimov (2010), Feyen (2014), Marzo et al (2014), Galushko (2016), Raildata (2017a), and on the information available on the Raildata website (Raildata, 2017b), UIC e-railfreight intermodal website (UIC, 2017b)

11 TAF TSI are the technical specification for interoperability relating to the telematics applications for freight subsystem of the rail system, issued as European Commission Regulation No 1305/2014 of 11 December 2014, and currently in force.

deemed too ambitious and not realistic. However, a group of UIC railways took the project forward, simplifying its scope in terms of possible messages exchanged. As a result of this effort, in 1995 Raildata set up the Orfeus system (Open Rail Freight EDI User System) to exchange ECNs, at first in parallel to paper ones. Raildata is a group of the UIC set up by cargo railway undertakings and tasked with developing electronic exchange of information related to rail cargo transport.

Following such developments, in 2008 a group of UIC members started a project to implement paperless rail transport by building on the Orfeus system. In 2009, the group of UIC members issued a first version of the technical specifications and Raildata created three formats of electronic consignment notes. The year 2013 saw part of the flow of trains between France and Germany exchanged with electronic consignment notes. In 2015, five rail undertakings (DB Schenker Rail Deutschland, Fret SNCF, Trenitalia, ČD Cargo and DB Schenker Rail Nederland) started using the electronic consignment notes for all conventional transport and in 2016 three others followed. However, there is no information about the use of electronic consignment notes for intermodal rail transport, yet.

The exchange of ECNs via Orfeus, which handles also e-CUV wagon notes, currently entails about 95,000 messages sent each month with consignment notes issued by the rail undertakings that origin the trains and then distributed by Orfeus to all other rail undertakings concerned. In fact, electronic documents are not exchanged directly among railways but sent to the Orfeus central system which also converts the messages across the three message formats currently allowed,[12] one of which is the e-rail freight format, fully compliant with CIM requirements for ECN.

Recent information on the use of Electronic Consignment Notes indicates that DB Cargo Germany and SNCF continue using the ECN and print it when trains are taken over by other rail undertakings. The electronic consignment note is also used by Mercitalia Rail and SNCF for part of the trains they exchange. Moreover, some daughter companies of DB Cargo exchange consignment data via Orfeus through the system of DB Cargo Germany. Finally, since October 2017 ČD Cargo and DB Cargo Germany use electronic transport documents (e-CUV) for the transport of empty wagons between Czechia and Germany. Paperless exchange also of loaded trains is foreseen in 2018. Currently loaded trains run with paper consignment notes and parallel ECNs. Indeed, while there is some uptake of ECNs, there are cases where currently ECN and paper documents are used in parallel.

As with other systems the faster development of the ECN depends on the number of rail undertakings that will change to it and on the pace at which they will shift. Further developments presently foreseen would include HZ Cargo (Croatia), which already receives ECNs from other railways, to start issuing them, too. Moreover, Rail Cargo Austria and DB Cargo Germany are expected to start using to ECNs but plan to do so only with the forthcoming simplified version of ECN, still entailing the parallel use of paper and electronic consignment notes.

An additional important next step is the development of CIM/SMGS electronic consignment notes. While for CIM the legal bases for the existence of the electronic version is founded on the functional equivalence, with SMGS it is based on an agreement between the carrier and the customer. Current work for the practical implementation of the e-CIM/SMGS is ongoing with the involvement of CIT, OSJD and Raildata.

[12] However, one of the message formats is in the process of being abandoned as obsolete.

3.2.6 THE DIGITAL TRANSPORT AND LOGISTICS FORUM SET UP BY THE EC[13]

The Digital Transport and Logistics Forum (DTLF) is an expert group set up by the European Commission in April 2015 (Decision [C(2015) 2259]) that focuses on promoting efficient electronic exchange of information in transport and logistics. It is a consultative body planned to be active for three years. Members of the expert group are EU Member States as well as transport and logistics stakeholders.

The motivation for the expert group is the need to take forward action 7 — e-Freight — of the White Paper Roadmap to a Single European Transport area that indicated electronic information exchange as key to optimise cargo transport.

So far, the DTLF has been working on fostering the use of e-transport documents and on increasing the exchange of information in electronic form related to freight transport along TEN-T corridors. In particular, concerning e-transport documents the DTLF is working on:

- The acceptance of e-versions of consignment notes by States authorities, banks and insurance companies;
- The harmonisation of information on transport document across modes, therefore aiming towards multimodal transport documents;
- The possibility to move to electronic versions also for documents of the vehicles and of the drivers.

The proceedings of the DTLF sessions offer some interesting points of general relevance:

- The issue of standards for e-documents stems from the existence of too many standards rather than by their lack. So, communication across systems and modes is currently possible only via systems that link the standards, which may compromise quality of communications. Moreover, different standards compromise interoperability, as it is particularly the case with semantics between standards and also between domains.[14]
- In some countries national legislations are a barrier to the use of e-documents. Indeed, several EU Member States need to look further into legitimacy, authenticity, and integrity of e-documents for transport. One often mentioned issue concerns the possibility to check e-documents during road side controls.
- There is a need to account for the specificities of SMEs who do not have the resources of corporations to enjoy the digitisation opportunity.
- Working with e-documents requires and imply a shift from thinking in terms of documents to thinking in terms of data.

[13] This section is based on the information about the DTLF provided on its webpage within the Register of Commission expert groups (EC, 2017) and on the proceedings of the DTLF sessions provided there.

[14] See also the UN CEFACT case study in section 4.2.5.

4. CASE STUDIES

The workshop on Railways, intermodal transport and the computerization of transport documents was held on 23 November 2017 as part of the works of the sixtieth session of the UNECE Working Party on Intermodal Transport and Logistics (WP 24). The work was organised in two parts, one on the contribution of railways to intermodal transport and the following one on the computerization of transport documents.

The two parts of the workshop were naturally linked since the experiences and case studies illustrated remarked the need for a comprehensive approach to ensure a sustained and increasing role of railways in intermodal transport, and in freight transport more generally. On the one hand infrastructures and rolling stock need to be available and reliable, on the other hand transport law, customs controls and formalities and document flows have a further key role in enabling swift transport operations to ensure that intermodal rail transport is an attractive option.

4.1 CASE STUDIES ON THE CONTRIBUTION OF RAILWAYS TO INTERMODAL TRANSPORT

4.1.1 The case study of Slovenia[15]

Slovenia is located along the Mediterranean and the Baltic Adriatic transport corridors (European Corridor V and European Corridor X) and foresees a growth of cargo flows by all modes. The Government of Slovenia sees as its role to establish the framework in which intermodal transport can take place, and it takes the view that transport solutions may be ensured by effective logistics chains, therefore it is working on developing new railway infrastructure and new infrastructure at the connections with other transport modes. In particular, actions being planned or developed include:

- New infrastructure in the port of Koper, comprising extensions of current piers and railway infrastructure, to facilitate the growth from the current throughput of 20 million tonnes of cargo per year to the 35 million tonnes per year expected in 2030 (Figure 38);
- A second track for the Koper-Divača railway line (see Figure 39), which follows a recent modernisation of the line, and aims to increase the capacity from the current 85 trains/day to 222 trains/day. The project is foreseen by an Act issued in 2017, and entails building several tunnels and bridges, requiring an estimated expense of 1 billion euro. A special company, acting as an internal state contractor, is tasked with the construction of the second track and is also to seek private and EU funds with the aim to establish a PPP.

[15] This section is based on the contribution and presentation by Mr. Jure LEBEN, State Secretary, Ministry of Infrastructure of the Republic of Slovenia, delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

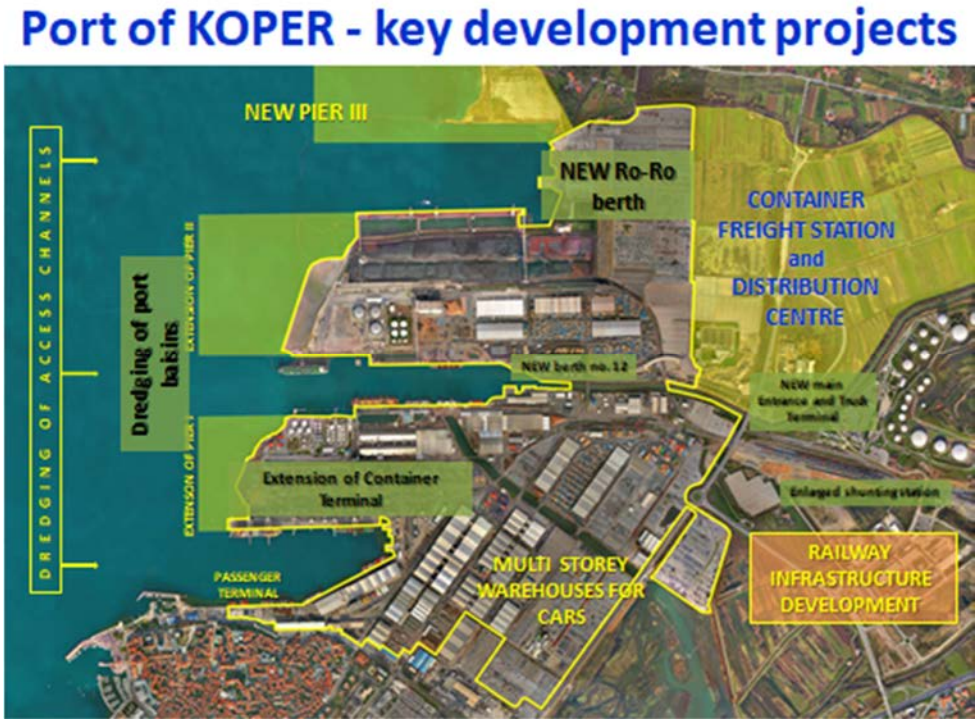


Figure 38. Development projects at the port of Koper (Source: Leben, 2017).

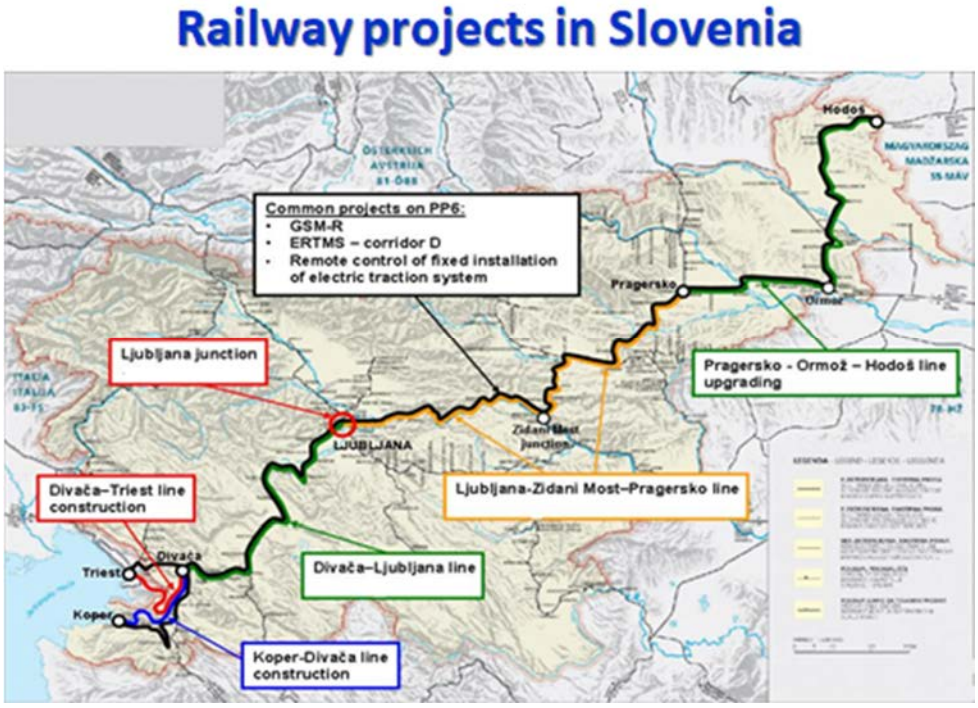


Figure 39. Railway projects in Slovenia among which is the second track for the Koper-Divača railway line (Source: Leben, 2017).

4.1.2 THE CASE STUDY OF THE RUSSIAN FEDERATION[16]

The Russian Federation is aiming to achieve the full potential of its railways for cargo transport particularly along international transport corridors and in combination with other transport modes. This strategic aim is pursued, *inter alia*, by providing state support for transit and infrastructure projects, with the development of terminal and logistics information systems, the enhancement of Customs law and tariff policy, and the connection of Russian regions to the system of international transport corridors.

In terms of infrastructures along Russian railways, a number of actions is ongoing with a view to supporting growing cargo flows and with the guiding principle that corridors should supplement one another as a network.

Key infrastructure projects include the modernization of the Baikal-Amur and Trans-Siberian railway, the development of the Primorye-1 and Primorye-2 international transport corridors between Russia and China, the reconstruction of the Makhalino-Khunchun border crossing and the "free port" of Vladivostok.

Altogether there are projects to develop and modernize the rail infrastructure in East Russia in order to handle extra cargo volumes of 66.8 million tonnes by 2022. Such projects entail the construction of more than 547 km of extra main lines, the construction and modernization of more than 91 rail stations and 42 passing loops, the equipment of 680 km of automatic block system (see also Figure 40).

In general, the work of the Russian Federation within the Euro-Asian Economic Union is particularly aimed at providing a one-stop service centre for railway transport, improving the unified customs code, and improving the connection between the EAEU and the Silk Road Economic Belt.

In terms of legislation, a number of changes in the Russian Federation law are being prepared and are especially intended to increase the attractiveness of intermodal transport by reducing transit times, improving the information on the services, as well as the quality of the services. Legislation changes concern in detail:

- Direct intermodal transport, for the development of direct intermodal communications and to enable the use of a single transport document for carriage by different modes;
- Shipping and forwarding operations: in particular regarding the terms of contract for transport operations and the information to customers about operators and services available;
- Legal aspects of cargo transit, aiming at the optimization of procedures and time for transit cargo controls.

Such current draft legislation aims towards a unified Euro-Asian railway law consistently with what stipulated by the Joint Declaration on the Promotion of a Euro-Asian Rail Transport and Activities Towards a Unified Railway Law, signed in Geneva on 26 February 2013 by Ministers of Transport interested in Euro-Asian rail transport. That Joint Declaration recognised the role of railways in accommodating growing Euro-Asian transport flows and decongesting seaports and intended to establish the legal conditions to enable railways to compete with other modes. In particular, it fosters

[16] This section is based on the contribution and presentation by Mr. Andrey Emelyanov, Deputy Director, Ministry of transport of the Russian Federation, delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents. Additionally, it quotes a part of the text of the joint declaration on the promotion of a Euro-Asian rail transport and activities towards a unified railway law, signed in Geneva on 26 February 2013.

the work towards the "unification of international railway law with the objective to allow rail carriage under a single legal regime from the Atlantic to the Pacific". To such aim, the Russian Federation remarks that long intermodal routes need collaboration, and supports the work towards the common CIM-SMGS electronic consignment note as well as the preparation of the Unified Railway Law.

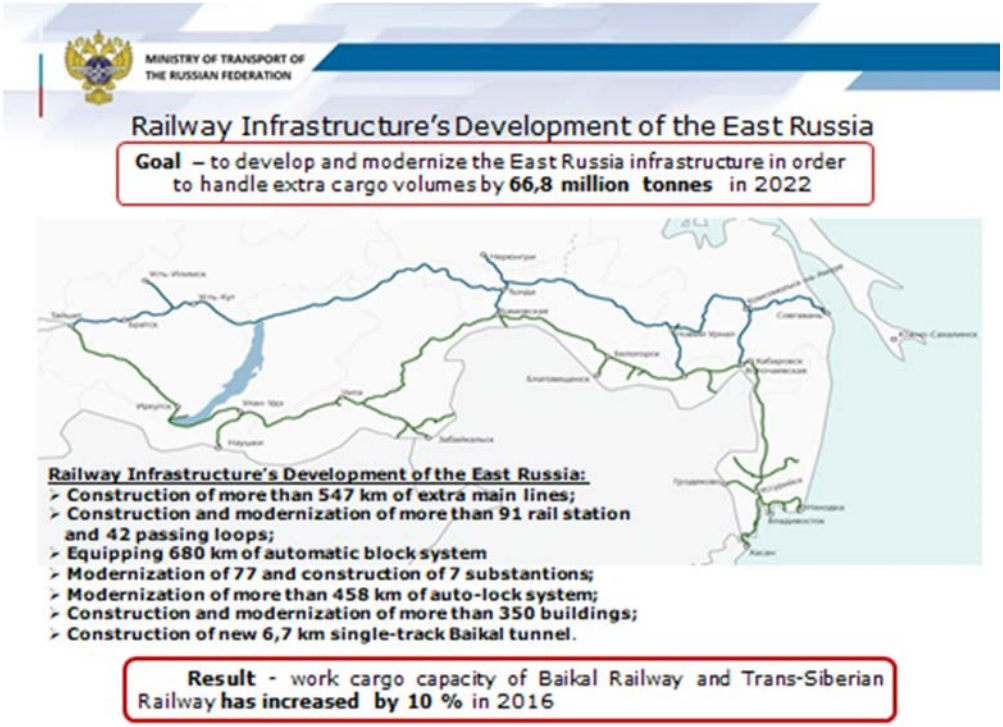


Figure 40. Railway infrastructure developments in East Russia (Source: Emelianov, 2017).

4.1.3 THE CASE STUDY OF THE SERBIA[17]

Serbia is located along the European Corridors X and VII, thus providing a connection for freight flows between east and west. The current goal of the Ministry of construction, transport and infrastructure is to provide conditions and infrastructure to foster intermodal transport. To that aim, the Ministry is working on developing both lines and terminals.

In more detail, the Ministry of construction, transport and infrastructure is working along the lines set in the Plan for Railway, Road, Water, Air and Intermodal Transport Development in the Republic of Serbia 2015-2020, and the General (Master) Plan of transport development in the Republic of Serbia between 2009 and 2027, as well as in multilateral and bilateral agreements with neighbouring countries.

[17] This section is based on the contribution and presentation by Ms. Ivana Bozic, Adviser, Ministry of Construction, Transport and Infrastructure, Serbia, delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

The work of the Ministry to promote intermodal transport is also set in a legal framework that include:

- A Law on Railways;
- A Regulation on stimulus measures to promote combined transport;
- A Regulation on combined transport to and from combined transport terminals located on the rail network.

Actions to develop infrastructures in Serbia comprise:

- The construction of an intermodal terminal in Belgrade, expected to start in 2018, for which project documentation has already been produced with EU funding support;
- The creation of a container terminal in the Belgrade MY railway station area, for which the project documentation has been finalised and funds to finance the construction are being sought;
- The construction of a freight transport centre in Belgrade, next to the Belgrade marshalling yard, whose project documentation has already been produced with EU funding support. The next step towards its implementation will be the preparation of a Detailed Regulation Plan.

Additional logistics centres are to be developed in Belgrade, Nis and Novi Sad, along the European Corridors X and VII. Moreover, further logistics centres with a national scope will be developed in regional economic centres. In particular, local governments are actively pursuing the construction of logistics centres in Backa Palanka, Pirto, Apatic, Sabac, Smederevo. The latter is a to be tri-modal terminal on the river Danube, and its construction will start in 2018.

Moreover, a new port is foreseen in Belgrade, whose construction is planned to start in 2020 (see also Figure 41).

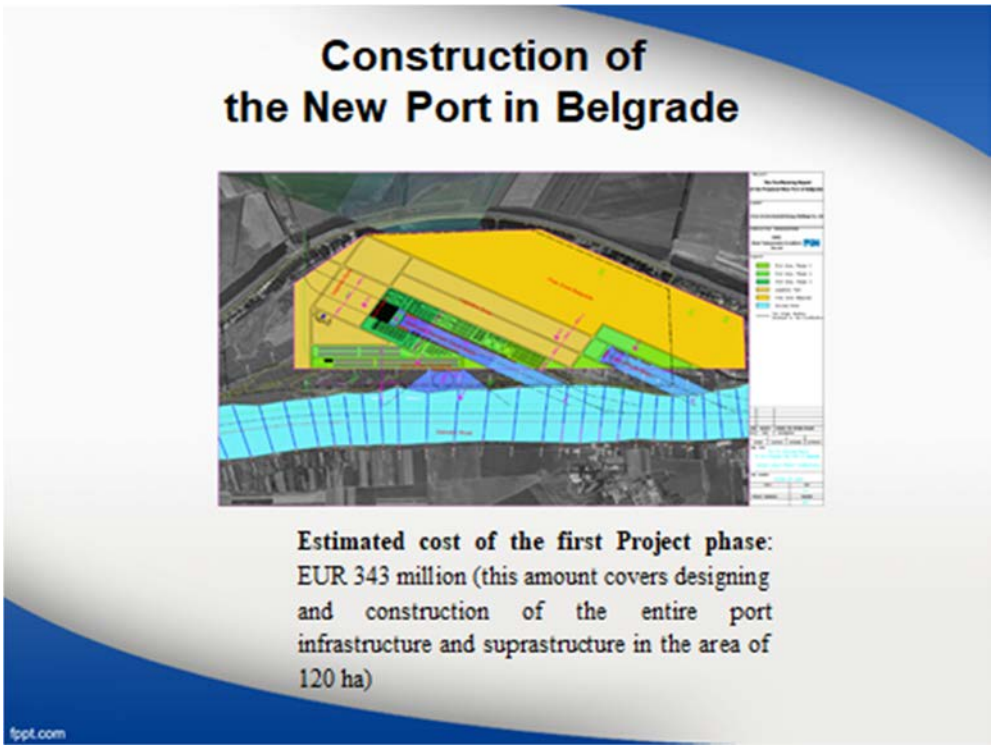


Figure 41. Plan for the construction of the new port in Belgrade (Source: Bozic, 2017).

4.1.4 THE CASE STUDY OF THE ISRAEL[18]

The Ministry of Transport of Israel has developed a Master Plan for freight haulage which includes recommendations for road and rail transport. The geographical situation of Israel entails a prevalence of short transport distances that are more suitable for road rather than for rail transport. However, the Israeli Ministry of transport believes there is still an economic benefit to further develop the freight railway system. As a result, the Master Plan includes recommendations aimed at actions in the short run to encourage more use of rail transport instead of truck transport as well as recommendations for the longer term regarding the development of the rail freight infrastructure. Those measures are included in a wider set of recommendations concerning improving regulation through laws, acts, orders, supervision and enforcement so as to improve freight haulage by trucks, and measures to improve connectivity between modes of transport. A dedicated team of the ministry is looking at the implementation of the Master Plan's recommendations.

In more detail, recommendations for actions in the short term to encourage the use of rail transport include:

- Increasing the priority of freight rail in operations on the rail network;
- Improving the connectivity with ports by upgrading the relevant links;
- Building effective economic incentives. In particular, those should include incentivizing container transport by rail based on units rather than weight, as it currently happens. Delivering incentives based on units would incentivize rail transport also for empty containers, whose negative externalities are almost the same as those of laden containers;
- Improving the level of service accounting for the role of rail in the entire logistics chain.

Rail infrastructure improvements include the current development of two major container terminals, one in Haifa and one in Ashdod. Each one is next to an existing container terminal which will also benefit from the improved connections to the railway network. Moreover, there are plans for the development of an inland terminal located geographically between the two ports, with the aim to reduce congestion in the vicinity of the seaports.

Rail freight in Israel is also benefitting from a recent reorganization of Israeli railways. In particular, the establishment of a rail freight subsidiary has resulted in more attention to freight customers and to the development of the business. It also resulted in the development of railway freight terminals and rail extensions.

The Master Plan for freight haulage of the Israeli Ministry of transport includes also recommendations on improving data, information and statistics about the transport market, and improving connectivity of transport modes. Both targets may be attained with the digitalization of procedures and documents.

A technological platform called Task Yam, including all the relevant parties in the maritime commerce and transport chain, has been developed in Israel for the promotion of digitized commercial processes in the maritime transport community. Taking part in the Task Yam is voluntary and uptake has so far been wide, thanks to benefits realised by operators with paperless processes. The Ministry hopes that the Israel Railway Company and the freight haulage operators will join the Task Yam as well.

[18] This section is based on the contribution and presentation by Mr. Opher Eliashar, Director, Financial Planning Ministry of Transport, Israel, delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

4.1.5 THE CASE STUDY OF THE COORDINATING COUNCIL ON TRANS-SIBERIAN TRANSPORTATION (CCTT)[19]

The Coordinating Council on Trans-Siberian Transportation (CCTT) indicated clearly the need for coordinated services to accommodate increasing flows along the Euro-Asian transport route.

Global container traffic is growing with currently increasing sea freight rates. Euro Asian railway transport routes have seen a consistent increase of flows over the period from 2014 to the first half of 2017 as illustrated by Figure 42 for the period 2014-2016. Moreover, flows in opposite directions are becoming balanced. The changing patterns of industrial geography in China –concerning its western and central regions — is also reshaping Euro-Asian transport with flows exchanged with China via Dostyk now associated to flows through Naushki, Zabaikalsk, and Valdivostok, as shown in Figure 43.

The total number of containers transported via the Trans-Siberian main line during the first half of 2017 has exceeded a million and there has been a shift in relevance of different crossing points. The latter may be noted when comparing the flows in the first half of 2017 with those in the first half of 2016 in Figure 44: the shares of traffic via Zamyn-Uud and those to far eastern ports (carried out in traffic with the Republic of Belarus) are growing.

The growing transport demand, the established transparency of international flows to customs, and the possibility to use alternative routes -also depending on required storage capacity- call for a view of rail transport in terms of integrated logistics services encompassing infrastructure, law, electronic seals, and systems such as those necessary to exchange documents. To offer faster and better services also systems to exchange e-documents are required. In order to pursue the result of effective logistics services and transport links all such elements must be optimized at the same time.

As for infrastructure, railways face many challenges to accommodate the growing transport flows. Many such challenges arise at the connections of the European and Asian networks, including differences in gauge, lengths of trains, loading gauge, and also bottlenecks such as the one currently experienced in Brest, Belarus, at the border with Poland.

As for document flows and administrative formalities, the project by FESCO to reduce drastically transit times of container imports to Russia via Eastern ports is an example of good practice. The project includes actions on the time required for preparation of contracts, on the time spent by trains in ports but also in terms of the time for clearance of cargo. In particular, the latter exceeded four days in 2016, it has been reduced to 2 days at the beginning of 2017 and current efforts aim at abating it to 5 hours at the end of 2017. Such improvements in timings, and therefore in rail transport effectiveness and attractiveness, have been achieved with the development of a unified cross-border document flow system.

Further, on the point of e-documents, and building on the successful experience on developing a CIM/SMGS consignment note, the CCTT aims to restart its working group for electronic document flow in international traffic and establish a cross border certifying center/notary service for flows of documents about transports – at the link between maritime and rail transport - and about commercial transactions.

[19] This section is based on the contribution and presentation by Ms. Natalia Stepanova, Deputy Secretary General, Coordinating Council on Trans-Siberian Transportation (CCTT), delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

CCTT also aims to develop an e-seal system, which would offer advantages to the clients who can monitor the status of the cargo, the security services (who can receive data on unauthorised openings of containers), the carrier (who can monitor the integrity of the cargo) and the Customs, who may inspect cargo data.

A further key element on which CCTT aims to work is the development of an international procedure to monitor the progress of the trains across different countries, motivated by the lack of accurate predictions on expected time of arrival faced by long distance Euro-Asian rail transport.

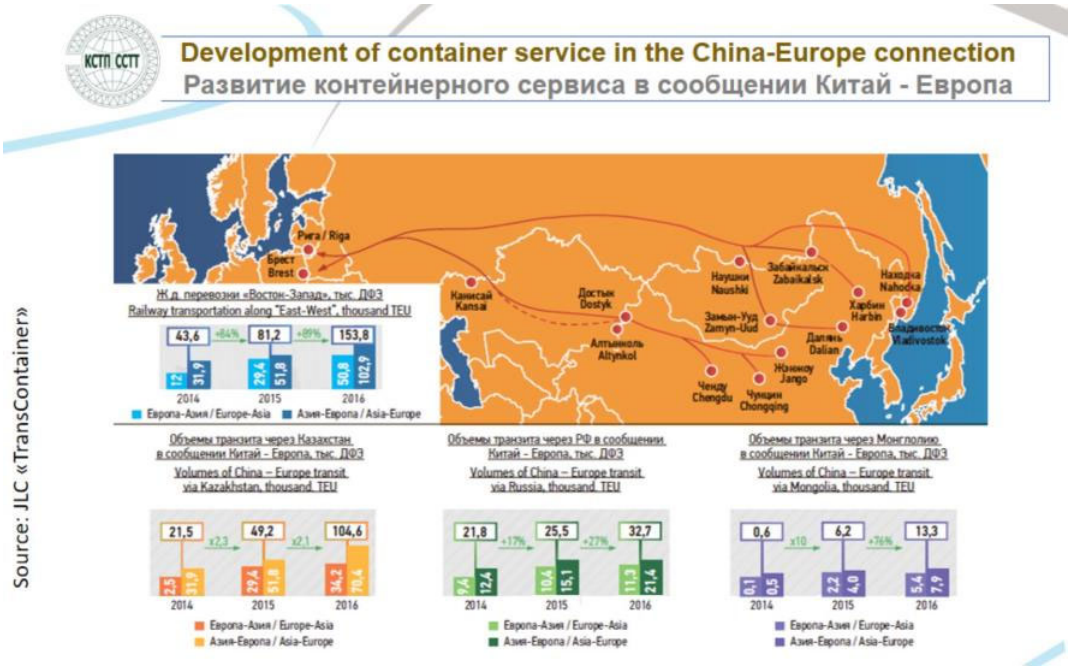


Figure 42. Development 2014-2016 of container services between China and Europe with figures comparing alternative routes (Source: Stepanova, 2017).

Figure 43. Changes in industrial patterns in western and central regions of China and effects on cargo flows (Source: Stepanova, 2017).

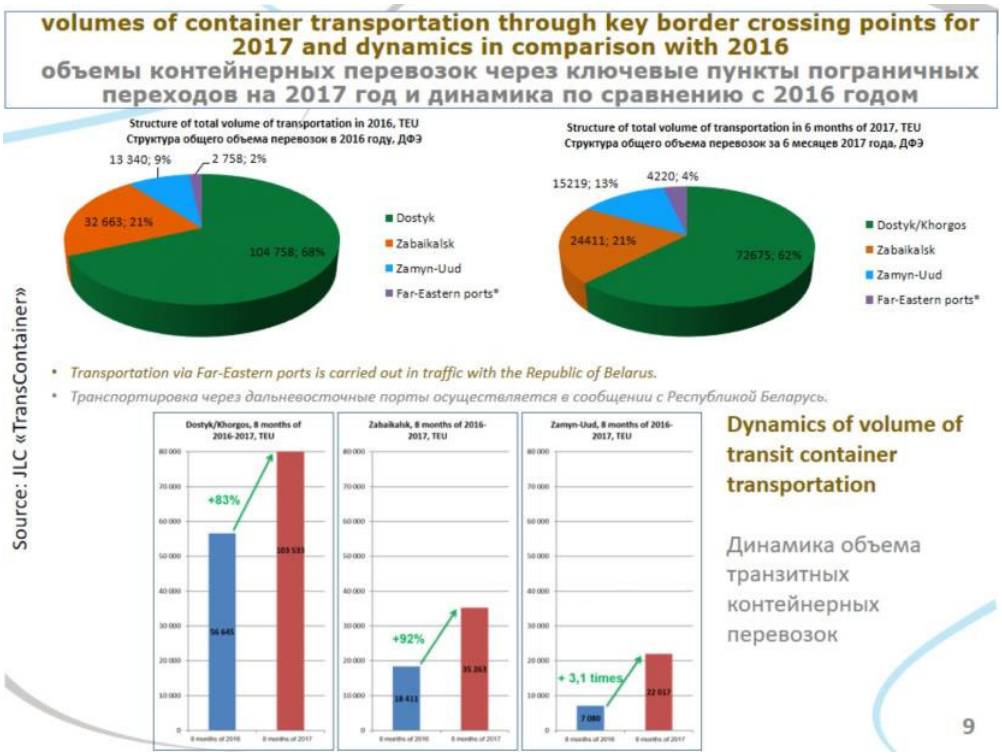


Figure 44. Comparison of container transport volumes via different border crossings between 2016 and 2017 with relative shifts in significance (Source: Stepanova, 2017).

4.1.6 THE CASE STUDY OF EUROPLATFORM[20]

Railways and intermodal transport need to be set within efficient supply chains in order to offer attractive transport solutions. Key infrastructural elements of such supply chains are logistics platforms or freight villages. About 100 freight villages, located along all European freight corridors, and belonging to nine different European countries[21] have formed the Europlatform EEIG[22] (European Economic Interest Grouping).

Europlatform characterised a freight village as a "centre in a defined area within which all activities relating to the transport, logistics and distribution of goods, both for national and international transit, are carried out by various operators on a commercial basis". Their role in intermodal transport is significant since they typically include an intermodal terminal, intermodal as well as transport and logistics warehouses, business centres and services related to cargo transport. One example of the joint contribution of freight villages and railways to intermodal transport is the case of inland dry ports

[20] This section is based on the contribution and presentation by Mr. Manuel Francisco Martínez Torres, Secretary General Europlatforms/Director Algeciras Logistic Area, Red Logistica de Andalucia, Spain, delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

[21] Denmark, Finland, Germany, Greece, Hungary, Italy, Poland Portugal, Spain.

[22] EEIGs are established on the base of the European Council Regulation (EEC) No 2137/85 and, as stated in art.3, "The purpose of a grouping shall be to facilitate or develop the economic activities of its members and to improve or increase the results of those activities".

for seaports where large and very large container ships call, thanks to the capacity of railways to deal efficiently with large numbers of intermodal transport units.

There are distinctive elements that make it possible for a logistic centre or freight village to contribute to effective intermodal transport. They are:

- The central management model aimed at providing efficiently tailored infrastructures, facilities and services. In particular, the central management model ensures contained costs of common services;
- The ability to stimulate synergies among the companies located within the freight village, create critical mass for external recognition and stakeholder management, and promote specialist training and the use of new technologies.

Logistics platforms and railways have a role also in the new logistics developments that need a tighter collaboration among the agents along logistics chains. A critical element of logistics chains is the preservation of the value of the cargo for the customers also in terms of time to destination be it due to actual perishability, commercial needs (for instance short commercial shelf life), or tightly timed production supply chains. Railways provide a good balance between cost, time and variation of travel time that ensures they have a role not just for intermodal transport but also for the foreseen introduction of syncromodality, whereby the choice of the most efficient transport mode for a shipment may be made or revised at any point along the transport chain. This, once more, calls for efficient logistics platforms providing connecting points along modes, storage and value added services.

4.1.7 THE CASE STUDY OF THE INTERNATIONAL UNION OF COMBINED ROAD/RAIL TRANSPORT COMPANIES (UIRR)[23]

The International Union of Combined Road/Rail Transport Companies is an association of European intermodal transport operators and intermodal terminals. They are convinced that intermodal transport can be effective when the framework conditions are right. The claim is supported by the growth of freight rail in Switzerland in terms of tonnes/year transported since 1984 and especially by the marked growth of intermodal transport through Switzerland over the same time span, depicted in the chart in Figure 45. This has happened thanks to the framework conditions, which have been, and still are, characterised by:

- Rail infrastructure developed coherently with strategic goals;
- Recognition of freight in train path capacity allocation and traffic rules;
- Development of capacity of lines and terminals;
- Intermodal rules clearly defined with predictable compensation offered.

[23] This section is based on the contribution and presentation by Mr. Ralf-Charley Schultze, President of International Union of Combined Road/Rail Transport Companies (UIRR), delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

However, the general overview is different. UIRR notes that Regulation EC 913/2010, establishing the European transport corridors, and aiming to address the problems of European rail freight has not yet been fully successful: the Rastatt incident demonstrated that the European Rail Corridors are not yet fully active. Moreover, there are different practices by different freight corridors and UIRR stresses the need for coordination among corridors to avoid the eventual establishment of different standard practices.

Many of the points by UIRR on rail freight corridors have also been made by several sector associations in a statement on "Boosting international rail freight", issued in 2016. Those include the need to foresee a role for operators at Executive Boards of Corridors. Additionally, there is a need for regular publication of KPIs to improve performance of Corridors. There is also a pressing need for overall better coordination for prompter responses to operators' requests of paths, especially by C-OSSs (Corridor One Stop Shops), whose role should be strengthened. On the KPIs it is noted that data on freight train paths is lacking: there is no data on freight train punctuality on corridors but sector data collection indicates great variations with averages estimated below 50 per cent to a 30 minutes standard. The same data are available instead for passenger traffic. UIRR calls also for the full implementation TAF — TSI (Telematics Applications for Freight — Technical Standard for Interoperability) and for the availability of reliable estimated time of arrival (ETA). The latter issue will be tackled in the Electronic Exchange of ETA Estimated Time of Arrival (ELETA project), co-funded by the EU as a CEF Action. ELETA started recently with the coordination of UIRR and the participation of several intermodal transport operators who will pilot measures to obtain ETA for their trains.

UIRR also underlines that bottlenecks to the development of intermodal transport include:

- Terminals, not up to the most recent parameters as for train length, total weight and profile and typically located far from key cities so without direct links to city logistics;
- Quality train paths, with lack of information on quality delivered by corridors and passenger traffic prioritized over freight;
- Different national railway rules, with work in progress by ERA, the European Railway Agency;
- Physical bottlenecks with uneven progress of infrastructure developments and lack of work coordination (see also Figure 46);
- Divergent regulatory frameworks/enforcement regimes, including the need to revise the EU Council Directive 92/106/EEC "on the establishment of common rules for certain types of combined transport of goods between member States", and unpredictable national compensation schemes (see also Figure 47). On the revision of the Combined Transport Directive, steps have been taken by the EC with the issuance on 8 November 2017 of the proposal for a new Directive.

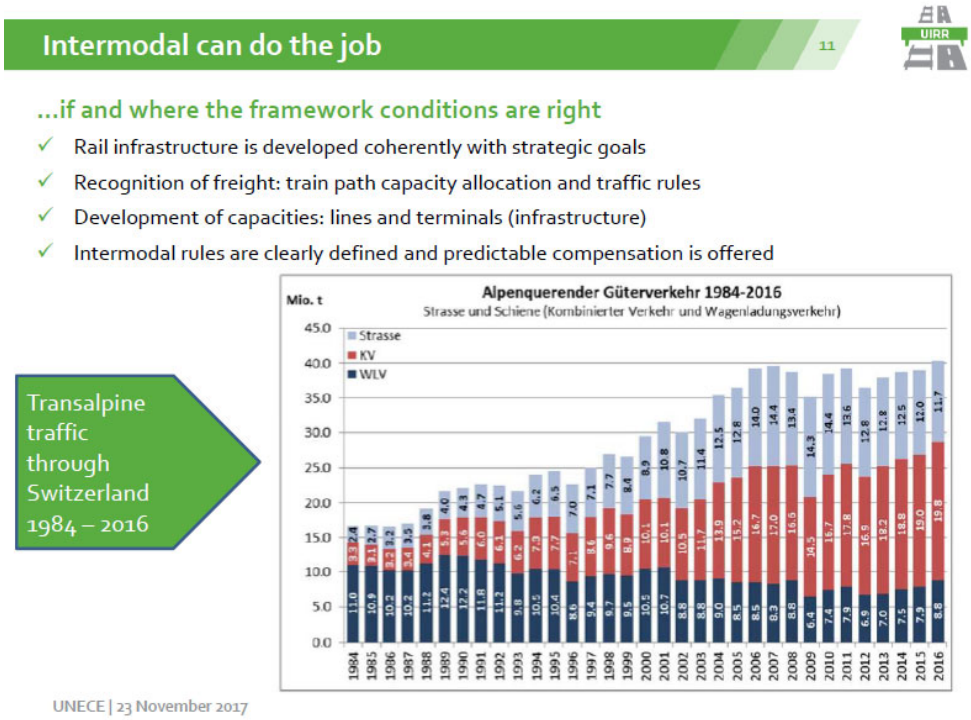


Figure 45. Evolution of transalpine freight traffic through Switzerland and framework conditions that facilitated it (Source: Schultze, 2017).

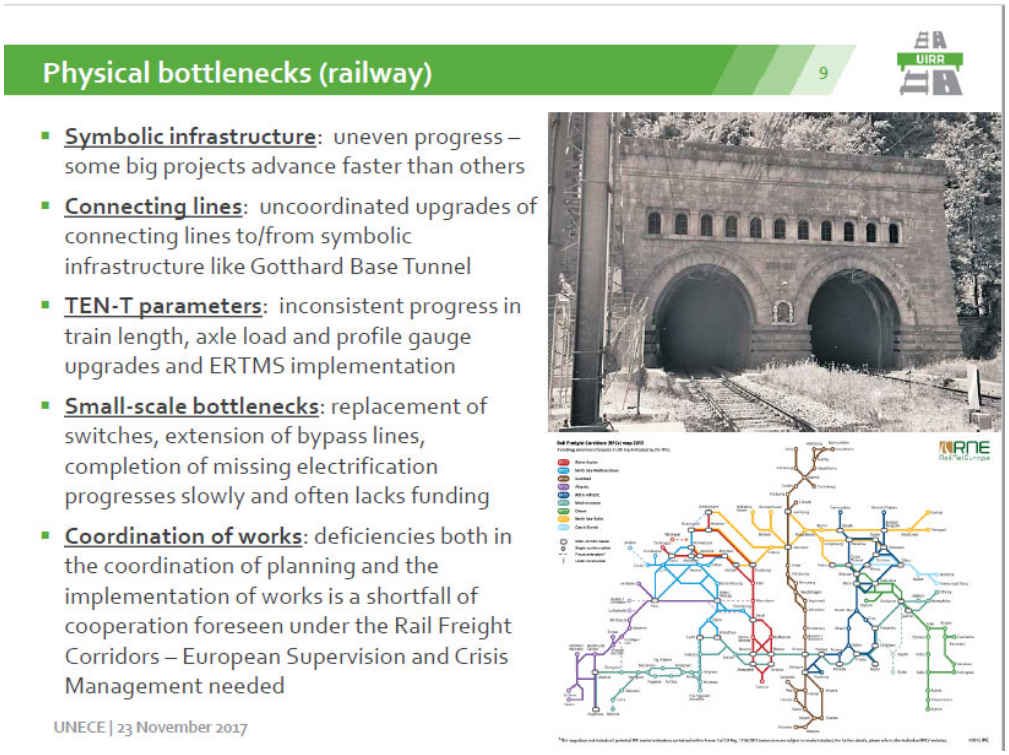


Figure 46. Detail of issues with physical railway bottlenecks along European rail freight corridors (Source: Schultze, 2017).

Figure 47. Detail of issues with divergent regulatory frameworks along European rail freight corridors (Source: Schultze, 2017).

4.1.8 THE CASE STUDY OF UNITED TRANSPORT AND LOGISTICS COMPANY (JSC "UTLC")[24]

UTLC is a Eurasian rail alliance dedicated to transit traffic and has been established as a joint project of the railways of Belarus, Russia and Kazakhstan. In the current situation of increasing flows of containers between Europe and China, 99 per cent of which shipped by sea, they are offering transport services between the crossings of Dostyk and Altynkol, at the border with China, and those of Kaliningrad, Bruzhi and Brest, at the changeover to the European railway system (Figure 48). To offer competitive services they are working on offering regularity, security, competitive tariffs and increased speed. Efforts on the latter points have taken to a transit time between the Chinese and the European changeover points of 4.8 days, starting from 10 days on 2014, with a target set to 3.5 days by the end of 2018 (see also Figure 49). ETLC is experiencing a growth in numbers of TEU/year transported, 165,000 by the end of 2017, and is aiming to transport 1 million containers in 2025.

[24] This section is based on the contribution and presentation by Ms. Larisa Korshunova, Counsellor to President of the United Transport and Logistics Company (JSC "UTLC"), delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

From its position as transit transport operator, UTLC sees a number of barriers and risks in the current Eurasian rail transport. In more detail, barriers and risks are related to:

- Limits of capacity at the EU border, caused also by works on the networks, which have affected recent operations and compromise the aim of fast and reliable services;
- Limited coordination between actors of the rail transport chain in EU and EAEU and lack of shared understanding of the demand for transport that should be accommodated;
- Need for investment in transport infrastructure also at borders to facilitate Euro-Asian transport;
- European transport prices being twice as those in EAEU and in China. UTLC remarks that the possibility to attract cargo to rail is very much dependent on prices. Since they are trying to reduce overall prices for the entire Eurasian long-distance rail transport option, transport prices in Europe are an issue;
- Shortage of wagons and traction. This is an issue that UTLC is already experiencing and, in the view of growing freight traffic, it is a risk in both the EU and the EAEU.

UTLC suggests that the solution to such barriers and risks lies in the creation of a wide alliance of Eurasian operators to coordinate activities and aim at joint goals, focusing on main Eurasian rail KPIs: speed, security, and pricing. This would also lead to common planning processes and harmonized technological standards at the 1520/1435 mm gauge connections.

Figure 48. UTLC transport services between the crossings of Dostyk and Altynkol at the border with China and those of Kaliningrad, Bruzhi and Brest, at the changeover to the European railway system (Source: Korshunova, 2017).

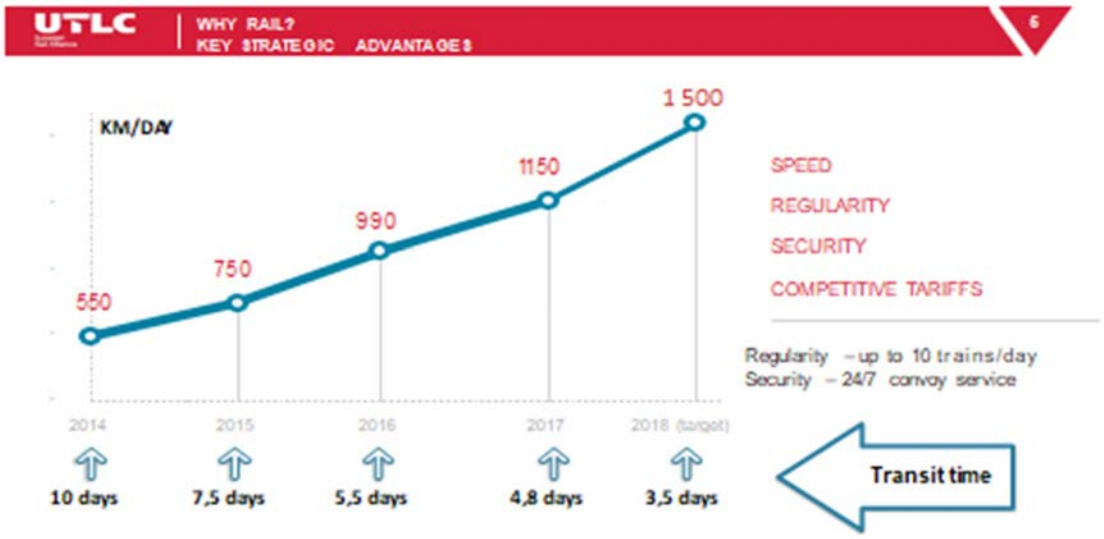


Figure 49. Current improvements in transit time and future targets (Source: Korshunova, 2017).

4.1.9 THE CASE STUDY OF THE GROUPEMENT EUROPEEN DU TRANSPORT COMBINÉ (GETC)[25]

The International Transport Forum (ITF) Transport Outlook 2015 forecasts that by 2050 international freight transport, expressed in billions of tonne-km, will quadruple as will the resulting CO_2 emissions. Freight transport is thus becoming the first source of CO_2 among surface transport modes. A solution to this problem is that all transport modes join forces and the intermodal transport unit is re-conceived around the semi-trailer, which is the only intermodal unit able to provide door-to-door transport. Maritime containers and swap bodies should also be uniformed to the semi-trailer. With such a uniformed set of intermodal units it would be possible to establish a global transport system requiring no intermediate reloading.

The 8’ standard width of maritime containers is the cause of reloading between maritime and continental transport. Instead a 2.60 m (8'6'') width of semitrailers and containers would be saturated by euro-palettes (1200 x 800 mm) and North American palettes (49 '' x 40 '': 1200 x 1000 mm). Table 5 shows the increases in loading capacity possible with a 16.15 x 2.60 x 2.90 m intermodal unit as compared to current intermodal transport units.

[25] Based on the material provided by Mr. Yves Laufer, President, *Groupement Europeen du Transport Combiné (GETC)*.

A unit with dimensions 16.15 x 2.60 x 2.90 m (53'x 8'6''x 8'6'')	+18% with respect to a 13.60 semitrailer (33 europalettes)
	+18% with respect to a 13.71 m 45' container (33 europalettes)
Would load 39 europalettes	+65% with respect to a 40' x 8' x 9'6'' container (23 europalettes)

Table 5. Comparison of loading capacity of a 16.15 x 2.60 x 2.90 m intermodal transport unit and current intermodal transport units in terms of europalettes.

Moreover, a semitrailer or container 2.60 m wide would be compatible with the road infrastructure and is in use in North America since several years both for road and rail transport (semitrailer on a flatcar). A container with those dimensions was used by NOL (APL) for maritime transport between China and the United States of America, thus showing that it fits a containership.

Additionally, the 16.15 x 2.60 x 2.90 m semitrailer or container would be the perfect compromise for the increase in size demanded for road freight vehicles and would support rail transport along corridors where large number of units could be transported with electric power by rail along base tunnels. The 16.15 x 2.60 x 2.90 m semitrailer or container would therefore be the quadrimodal unit for surface transport.

The following benefits could be obtained with the 16.15 x 2.60 x 2.90 m semitrailer or container:

- No more transhipments and reloading required with ensuing reductions of handling, reconditioning, loss of time, risks of theft, empty runs;
- Improved transport efficiency: no more reloading required and optimization of warehouses;
- Reductions of costs due to increase in carrying capacity, and transhipments no longer required.
- Easier and faster border controls;
- Improvement of safety and security (against intruders) thanks to units with secure seals;
- Overcoming of the "missing link" in transport chains caused by the width of 8 'or 2.435 m and obtain global innovation with perfect modal shift;
- Reduction of CO_2 emissions due to increasing transportation flows as compared with current intermodal transport units.

GETC proposes to use the 16.15 x 2.60 x 2.90 m/53 'x 8'6' 'x 9'6' units for the "One Belt, One Road" project of China. With that initiative, it would be possible to set up by 2050 a unified, green, seamless, and global transportation system.

4.2 CASE STUDIES ON THE COMPUTERIZATION OF TRANSPORT DOCUMENTS

4.2.1 THE CASE STUDY OF E-CMR[26]

The Convention on the Contract for the International Carriage of Goods by Road (CMR) came into force in 1956 and has currently 55 contracting parties (illustrated in Figure 50). As stipulated in article 1, the Convention applies to every contract for the carriage of goods by road in vehicles for reward if origin and destination are situated in two different countries and at least one of them is a contracting party. It is one the very few Conventions at UNECE that relates to private law rather than to public law.

The CMR Convention concerns the contract conditions, the contract document (consignment note) as well as the carrier's liability limits in case of total or partial loss of the goods carried, or in case of delay. The Convention also defines the content of the consignment note (also known as CMR consignment note), which confirms the contract of carriage. The elements forming the content of the consignment note are called particulars. There are eleven mandatory particulars, as follows:

(a) The date of the consignment note and the place at which it is made out;
(b) The name and address of the sender;
(c) The name and address of the carrier;
(d) The place and the date of taking over of the goods and the place designated for delivery;
(e) The name and address of the consignee;
(f) The description in common use of the nature of the goods and the method of packing, and, in the case of dangerous goods, their generally recognized description;
(g) The number of packages and their special marks and numbers;
(h) The gross weight of the goods or their quantity otherwise expressed;
(i) Charges relating to the carriage (carriage charges, supplementary charges, Customs duties and other charges incurred from the making of the contract to the time of delivery);
(j) The requisite instructions for customs and other formalities;
(k) A statement that the carriage is subject, notwithstanding any clause to the contrary, to the provisions of this Convention.

Moreover, there are seven optional particulars, to be written out when applicable. Among the optional particulars is the value of the goods, whose presence on the consignment note implies that damages are calculated in relation to the value indicated rather than with reference to the base and maximum values indicated by the Convention in article 23.

The consignment note is a proof of the carriage contract between the sender and the carrier and is valid in a court of law. While the Convention stipulates the particulars that must appear on a CMR consignment note, it does not specify the layout. In fact, there are many possible layouts, the most popular being the one developed by the International Road Union (IRU).

[26] This section is based on the contribution and presentation by secretariat, UNECE Working Party on Road Transport (SC.1), delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

The electronic version of the CMR consignment note, the e-CMR, is the subject of an Additional Protocol to the CMR Convention[27] which entered into force in 2011. Access to the Additional Protocol concerning the e-CMR is possible only for countries that are part of the CMR Convention. At present, the e-CMR has 13 contracting parties, illustrated in Figure 51.

The e-CMR contains the same particulars of its paper version and the Additional Protocol to the Convention underlines that the procedure used for the electronic consignment note must ensure the integrity of the particulars that is they must remain complete and unaltered. Integrity of the particulars is a key point for the application of the e-CMR. Therefore, while the paper CMR requires a form with the mandatory particulars and, if applicable, the optional ones, the e-CMR requires the particulars and an agreement on the procedures for the operation of the e-CMR, and on the implementation of such procedures. More precisely, as per article 5 of the e-CMR Convention, sender, carrier and consignor have to agree on the following items:

(a) The method for the issuance and the delivery of the electronic consignment note to the entitled party;
(b) An assurance that the electronic consignment note retains its integrity;
(c) The manner in which the party entitled to the rights arising out of the electronic consignment note is able to demonstrate that entitlement;
(d) The way in which confirmation is given that delivery to the consignee has been effected;
(e) The procedures for supplementing or amending the electronic consignment note; and
(f) The procedures for the possible replacement of the electronic consignment note by a consignment note issued by different means.

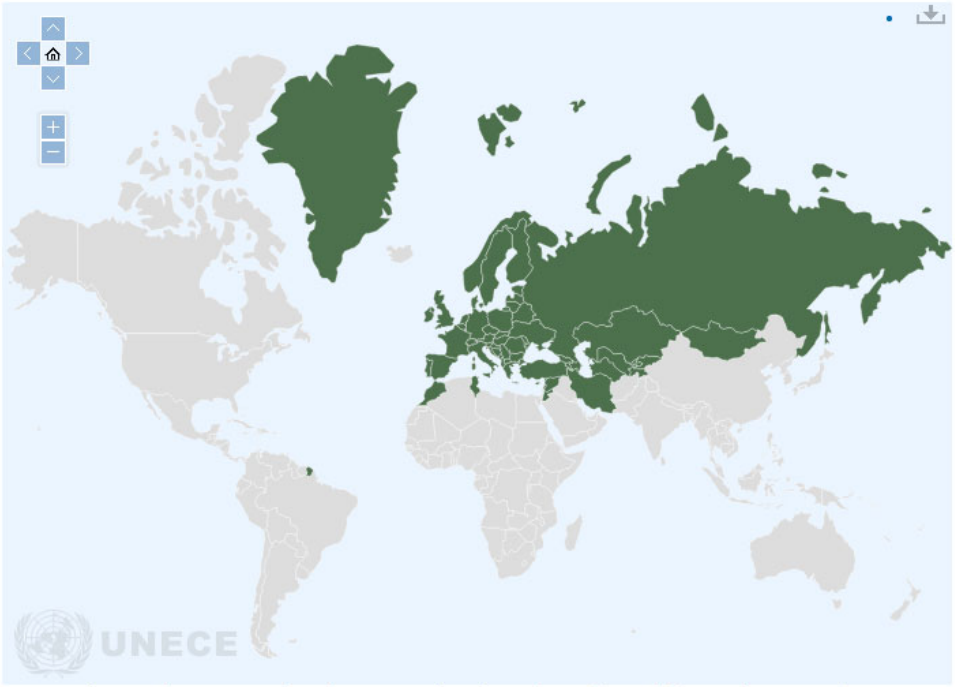
Presumably such an agreement must be reached each time an e-CMR note is issued. Given a large number of senders, carriers, and consignees, setting up a procedure for each carriage contract or each actor or, even, group of actors would be inefficient. Therefore, the UNECE secretariat believes that working on developing a common central platform ("e-CMR central") which all interested parties could use and rely upon to create and exchange information would be a better solution.

At present there is no regular operation of the e-CMR although there have been tests: one took place between Spain and France. Another test took place in the Netherlands where a private company has developed an e-CMR platform.[28] In fact, nothing in the Convention prevents private parties from developing e-CMR platforms or software. Additionally, it is noteworthy that currently there are legal issues when entering countries that are not contracting parties to the e-CMR Convention.

It should be remarked that the UNECE secretariat believes that governments and customs should be able to access the potential e-CMR platform even though it would host private contracts. This is because it is not rare that in some countries drivers are asked to show the paper CMR consignment note for risk management purposes by the competent national authorities.

[27] The Additional Protocol to the Convention on the Contract for the International Carriage of Goods by Road (CMR) concerning the Electronic Consignment Note.

[28] See also the brief account of those tests given in section 3.2.1.



Convention on the Contract for the International Carriage of Goods by Road (CMR), of 19 May 1956

Figure 50. Geographical overview of the 55 contracting parties to the Convention on the Contract for the International Carriage of Goods by Road (CMR) (Source: unece.org).

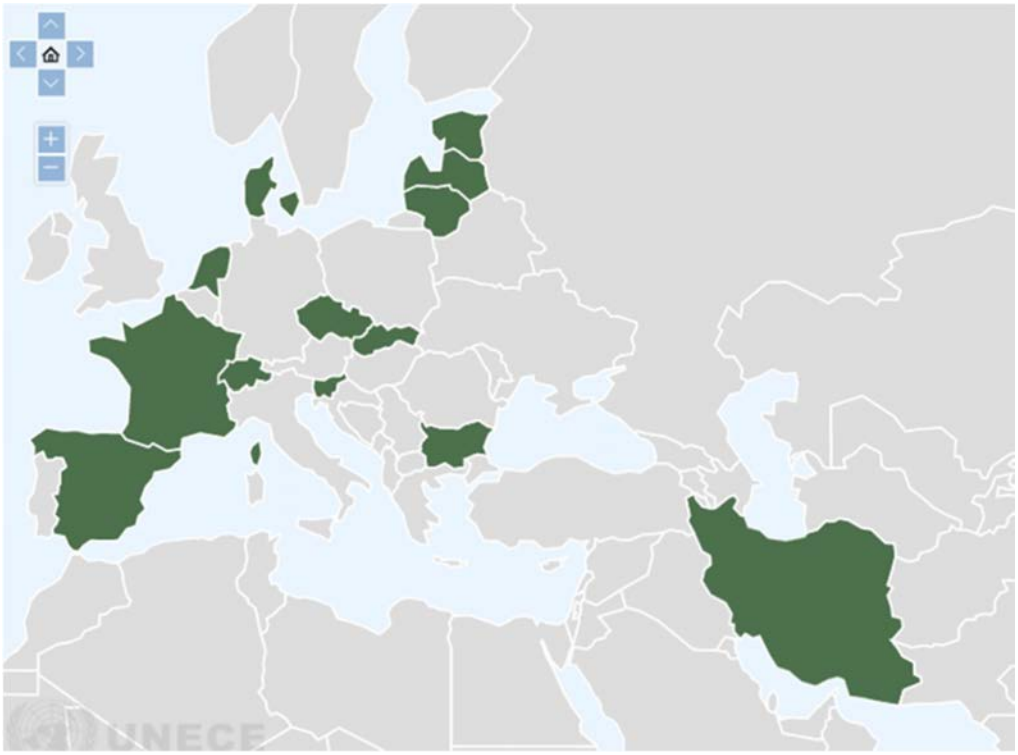


Figure 51. Geographical overview of the 13 contracting parties to the Additional Protocol concerning the e-CMR (Source: unece.org).

4.2.2 THE CASE STUDY OF E-TIR[29]

TIR (Transports Internationaux Routiers) is the only global intermodal Customs transit procedure. It not only serves as an efficient transport facilitation tool but also provides Customs administrations with the necessary guarantee to allow for swift international transport of goods. The procedure is based on the mutual recognition of the checks carried out at the customs office of departure, on the integrity of the container or of the part of the truck that contains the goods and on the TIR carnet, which is used to submit the actual Customs transit declaration. The TIR carnet is the proof of existence of an international guarantee for Customs duties and allows the exchange of information between customs administrations. More specifically, authorized carriers use the TIR carnet to declare the goods transported to all customs administration along the itinerary. At the Customs office of departure, customs officers check and seal the truck or container, which has to be approved for transports under customs seals. The carrier purchases the TIR carnet from a national association affiliated to the IRU, which is authorized by the contracting parties to the TIR Convention to print and distribute TIR carnets as well as to manage the international guarantee system. The TIR carnet, as mentioned above, is also a guarantee for duties and taxes that might become due would transit be illegally interrupted and the goods transported be put in free circulation. The TIR carnet is carried by the driver and accompanies the sealed truck during the journey. It is valid only for one transport and contains vouchers for each

[29] This section is based on the contribution and presentation by Mr. Andre SCEIA, Information Systems Officer, TIR secretariat (UNECE), delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

customs office along the route. Customs at borders along the route and at destination know that the cargo is exactly what has been declared at the customs in the country of departure by verifying the integrity of the seal and of the truck or container. At each positive control, customs stamp the TIR carnet and remove the voucher corresponding to their part of the journey. Eventually, Customs in the destination country will open the seal after a final check of its integrity and the carrier may deliver the goods. The TIR procedure includes also the possibility of multiple loading or unloading of the truck along the way.

The TIR system is made possible by five pillars:

1. The use of secure vehicles or containers;
2. The existence of an international guarantee on possible duties and taxes, of which the TIR carnet is proof of existence;
3. The TIR carnet, the internationally recognised customs document, which is used for Customs operations;
4. The mutual recognition of customs control (although customs at any point along the route retain the right to inspect the goods);
5. The controlled access to the goods, guaranteed by the integrity of the seal.

The TIR system thus allows saving time and avoiding the expenses due to the application at each border crossing of national customs controls, inspection and purchase of guarantees to cover potential duties and taxes.

The Customs Convention on the International Transport of Goods under Cover of TIR Carnets was first established in 1959. The current Convention is the result of a revision produced in 1975, developed also to account for containers and swap bodies. TIR therefore may cover transports including legs by rail, inland waterways, or sea as long as a part of the carriages is made by road. This makes the TIR an intermodal trade facilitation tool. At present the TIR Convention has 71 Contracting Parties (illustrated in Figure 52). It is operational in Europe, North Africa, the Near and Middle East, and Asia. Furthermore, there are several interested parties. More than 33,000 operators are authorized to use the TIR system and around 1.5 million TIR transports are carried out per year.

TIR contracting parties have started the eTIR project with the aim to fully computerize the TIR procedure. At the heart of the eTIR system, lies an international centralised platform used to register the guarantees issued under the TIR convention which also allows customs to securely exchange data. The platform connects IT systems of Customs, the guarantee chain and transport companies, and could be hosted by UNECE as it is the case for the pilots described below. At this stage, the development and operational costs of the eTIR platform are funded by a Contribution Agreement which accompanies a Memorandum of Understanding between IRU and UNECE signed in 2017.

It should be noted that the TIR procedure has already partly been computerized[30] and that the eTIR project aims at integrating all the systems developed so far.

[30] The TIR Electronic Pre-Declarations (TIR-EPD) is a system allowing transport operators to send electronically in advance to the Customs the information on goods transported under TIR procedure. The Real-Time Safe TIR (RTS) application allows Customs to send the confirmation of termination of the TIR operations at Customs offices of destination and perform real-time checks on the validity of TIR carnets. National associations use the ASKTIRweb application to manage TIR carnets from their request to their return at the end of the TIR journey. An account of such operations is given in section 3.2.2.

Figure 53 shows a high-level view of exchange of information between the public and private actors taking part in the eTIR system. The eTIR international system receives information from the guarantee chain on the guarantees provided and informs it of the progress of relevant transport operations. It also provides the customs of different countries with a platform to share information.

A first eTIR pilot has taken place from December 2015 to February 2017 between Iran and Turkey (see Figure 54) and involved a limited number of inland customs, a limited number of customs offices and one border crossing point. To carry out the pilot the existing electronic procedures of the two countries have been connected. Thanks to eTIR Customs could receive information on transports in advance so as to carry out appropriate risk management. The pilot was successful but operators had to revert to "print at home" carnets to manually sign their declarations as the use of a standard electronic signature for both countries would have required changes to national legislations.

A second eTIR pilot is taking place between Georgia and Turkey and focuses customs to customs exchange of TIR data (see Figure 55). It started in 2015 and is still on-going. The pilot has been made possible by the signature of a Protocol on electronic data exchange between the governments of Georgia and of Turkey.

Further work at UNECE on the eTIR project will involve identifying the synergies between the pilots to improve the eTIR system in view of a geographical expansion. Moreover, TIR contracting parties are still working on finalizing the legal basis of eTIR.

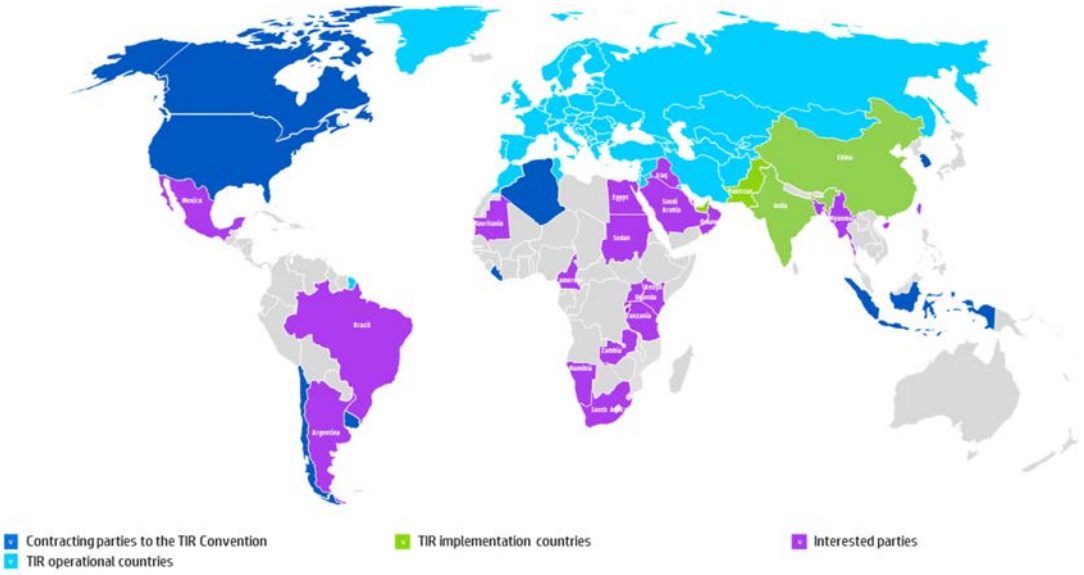


Figure 52. Geographical scope of the TIR convention (Source: Sceia, 2017).

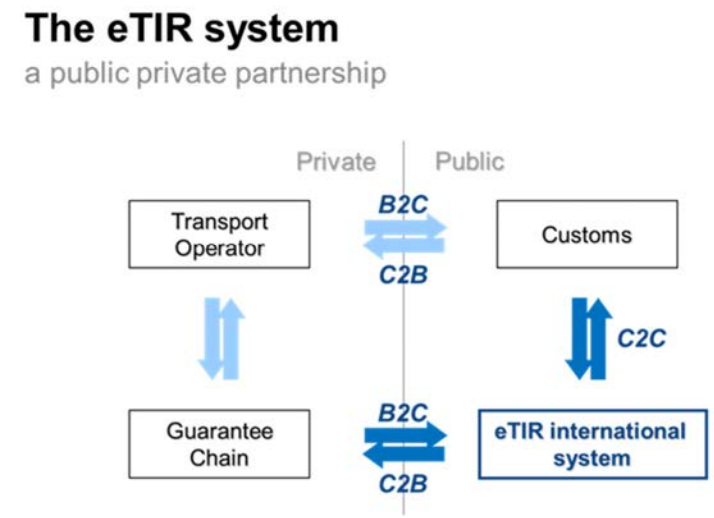


Figure 53. The exchange of information in the e-TIR system. Note that, in this picture, B2C stands for business to customs (Source: Sceia, 2017).

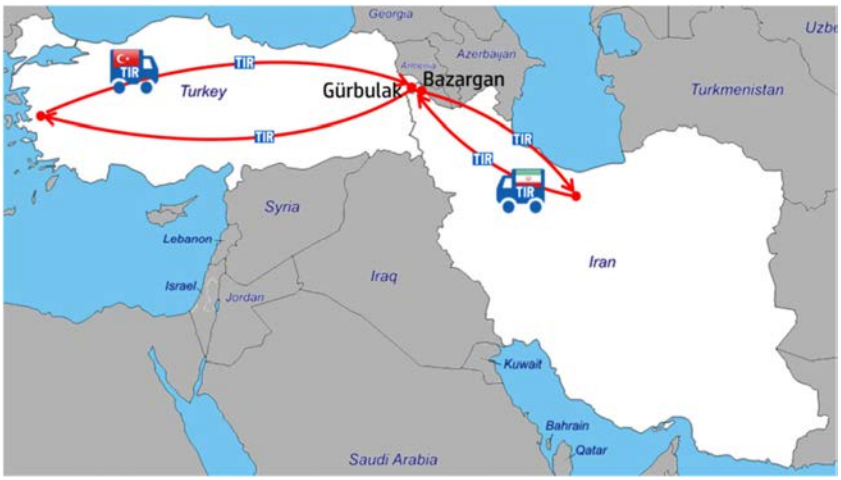


Figure 54. The location of the first e-TIR pilot project (Source: Sceia, 2017).

Figure 55. The location and functioning of the second e-TIR pilot project, currently ongoing (Source: Sceia, 2017).

4.2.3 THE CASE STUDY OF THE CIT: COTIF, MULTIMODAL TRANSPORT DOCUMENTS, E-CIM AND E-CIM/SMGS[31]

The work of the International Rail Transport Committee (CIT), is motivated by the objective of a single legal regime for all modes of transport, able to take mode specificities into account. Their work on multimodal transport legal regimes and documents focuses on legal interoperability and is carried out notwithstanding a reality where legal regimes are different by mode. For instance, CMR applies to international road transport while CIM or SMGS apply to rail transport, and the 1980 Geneva Convention on multimodal transport of goods has not come into force.

A first multimodal approach is taken by the COTIF/CIM. COTIF is the Convention concerning the International Carriage by Rail and CIM is appendix B to COTIF on Uniform Rules concerning the Contract for International Carriage of Freight by Rail. CIM applies to international multimodal transport carried out under a single contract as long as one leg is by rail. More precisely the CIM applies when international carriage by rail is supplemented by national carriage by road or inland waterway and all carriages are executed within a single contract. CIM also applies when rail is supplemented by inland waterway or maritime carriage, again for international transport and within a single contract. In particular, when goods are unloaded from the vehicles the CIM applies rather than the CMR. The same is true when road transport is only a supplement to international carriage by rail. The geographical scope of application of the COTIF/CIM is illustrated in Figure 56.

Current efforts towards a multimodal legal regime include a cooperation between CIT and IRU, which has resulted in an analysis of the CMR/CIM/SMGS legal regimes (whose geographical scope is shown in Figure 57). The analysis has been published in 2017 and results include a matrix to compare CMR/CIM/SMGS for multimodal rail-road transport. Further on this strand of work, CIT and IRU intend to develop a checklist for road-rail combined traffic based on practical case examples from CIT and IRU members, that will then be examined by CIT members and discussed with IRU.

CIT is also working on rail-sea transport and in 2015 it has produced a set of General Terms and Conditions that apply to joint contracting of rail-sea freight traffic. They account for the specificities of maritime and rail transport. An initial application was postponed as the routes initially chosen for the tests are not currently operated due to the local political situation.

CIT also developed a boilerplate contract for rail-sea traffic, which is available since 2016 and applies the model of successive carriers: maritime carriers can appear as successive carriers. The boilerplate contract includes the specification of the objective of the contract, the obligations, the procedures related to carriage, the compensation, the applicable law, the jurisdiction, the general provisions.

As a next step, CIT foresees promoting the General Terms and Conditions for rail-sea traffic also by applying them to pilot routes using the boilerplate contract available.

[31] This section is based on the contribution and presentation by Mr. Cesare Brand, Secretary General of CIT, delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

CIT is also working on the digitalisation of several rail documents:

- e-Consignment Note CIM (ECN CIM);
- e-Wagon Note CUV;
- e-Formal Report CIT20 (a form that is used in case of damage);
- e-Consignment Note CIM/SMGS.

In particular, on the ECN CIM, CIT has published four reference Manuals on 1 January 2017 and has finalised the legal and functional specifications for the ECN CIM and e-Wagon note CUV.

Work with OSJD towards an Electronic Consignment Note CIM/SMGS has resulted in the update of the functional specifications based on the revision of SMGS, and in the update of the legal specifications. The technical specifications have been finalised on expert level in October 2017 and CIT expects the CIM/SMGS Electronic Consignment Note to come into force on 1 January 2019 or 1 July 2019.

An additional point made by CIT is that the solutions developed should allow for commercial practical applications rather than state driven digitalisation to take into account the different roles of businesses and of governments. Moreover, they would not like to see solutions with scope limited to the EU and would aim for solutions that cover all transports.

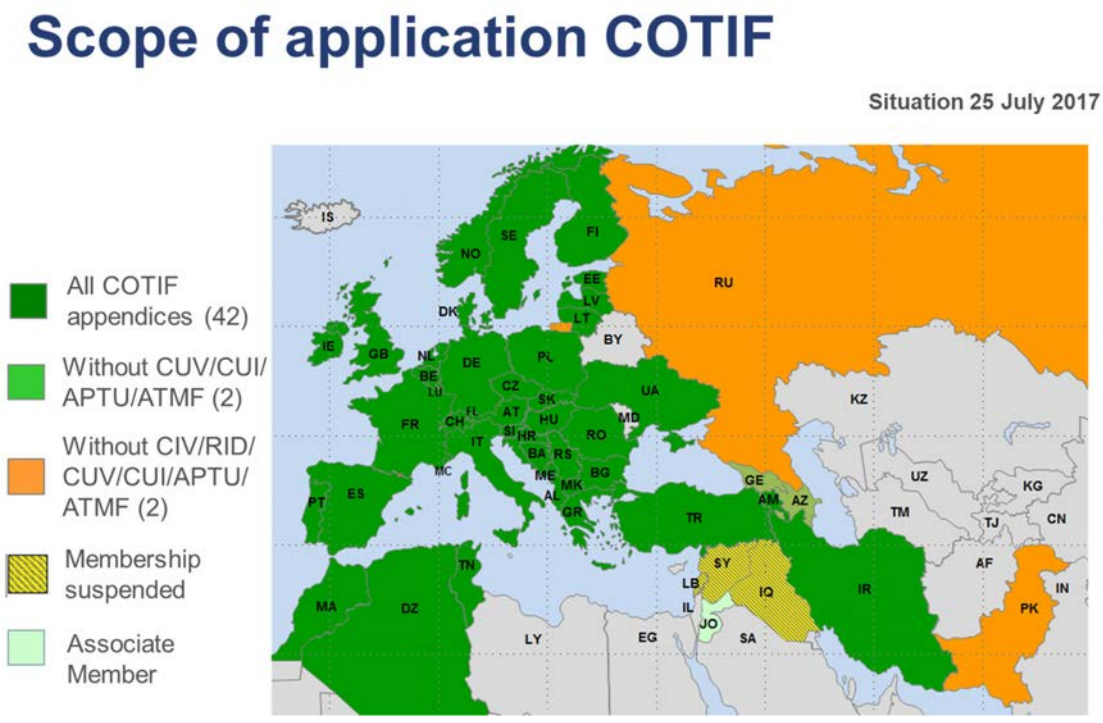


Figure 56. Geographical scope of application of COTIF and its appendices, among which the CIM. Reference date 25 July 2017 (Source: Brand, 2007).

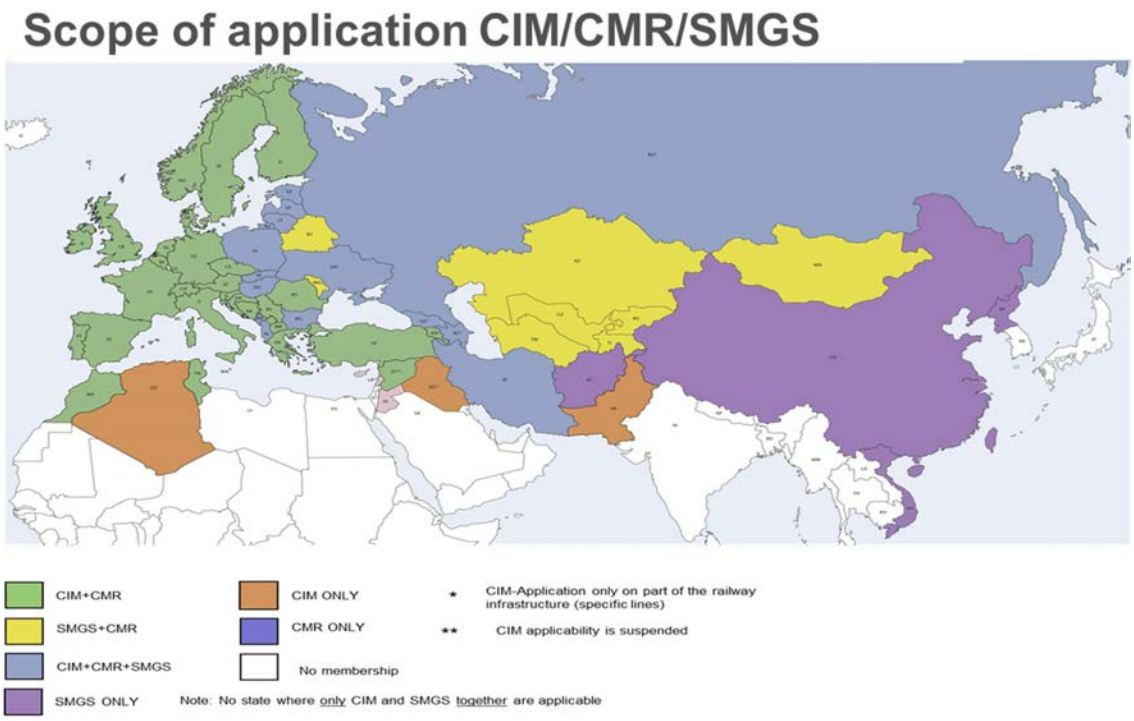


Figure 57. Geographical scope of application of CIM/CMR/SMGS (Source: Brand, 2007).

4.2.4 THE CASE STUDY OF JSC RUSSIAN RAILWAYS[32]

Joint Stock Company (JSC) Russian Railways use electronic data exchange and electronic signature for a large number of transport and customs operations and are working to further the transition to electronic data exchange within the EAEU and other neighbouring countries. As a result, JSC is able to increase the speed of trains through its network, enhancing the attractiveness of rail transport also with up to date instruments to interact with other transport modes (see also Figure 58).

More specifically, all the stations of JSC "RZD" open for cargo operations, over 3,600 in total, are connected to the electronic signature system. This makes it possible for about 1,800,000 documents every month to be signed electronically, so that some 80 per cent of internal transport operations are carried out by using documents with electronic signatures.

Data are exchanged electronically between JSC Russian Railways, operators and customs to the east and to the west of Russia. There are agreements for electronic data exchange with China, Mongolia, Finland, Poland, Belarus, Ukraine, Kazakhstan, Azerbaijan, Latvia, Lithuania, Estonia and with customs authorities. In particular, electronic data exchange with China was subject to some delay and is now starting. The Russian Railways plan also to have electronic data exchanges with the Democratic People's Republic of Korea and with maritime transport.

[32] This section is based on the contribution and presentation by Ms. Inessa Yakovleva, Deputy director, JSC "Russian Railways", delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

Current results have been achieved after work on EDI with state bodies that started in 2011. In 2015 JSC run an experiment about data exchange between Russia and Finland resulting in all the interactions with customs being with electronic signature in 2017. This affords major time savings at borders: formal procedures can be carried out in 1-2 hours whereas previously they would require up to 12-24 hours, depending on whether controls were about imports or exports, as shown in Figure 59.

JSC Russian Railways are now working towards:

- Extending electronic documents to transit declaration execution and customs transit procedure completion in seaports with the involvement of port services, shipping operators, and stevedores;
- Electronic interaction with state control bodies and railways of the EAEU Member states when performing customs operations during cargo transport through the EAEU;
- Implementing the electronic interchange with the Federal Customs Service and the Federal Tax Services for confirmation of the 0 per cent VAT rate, for which an experiment started in July 2017.

Moreover, JSD is working with Belarus Railways to develop software for e-consignment notes that will be ready in 2019 as well as to create an international platform to track trains and goods.

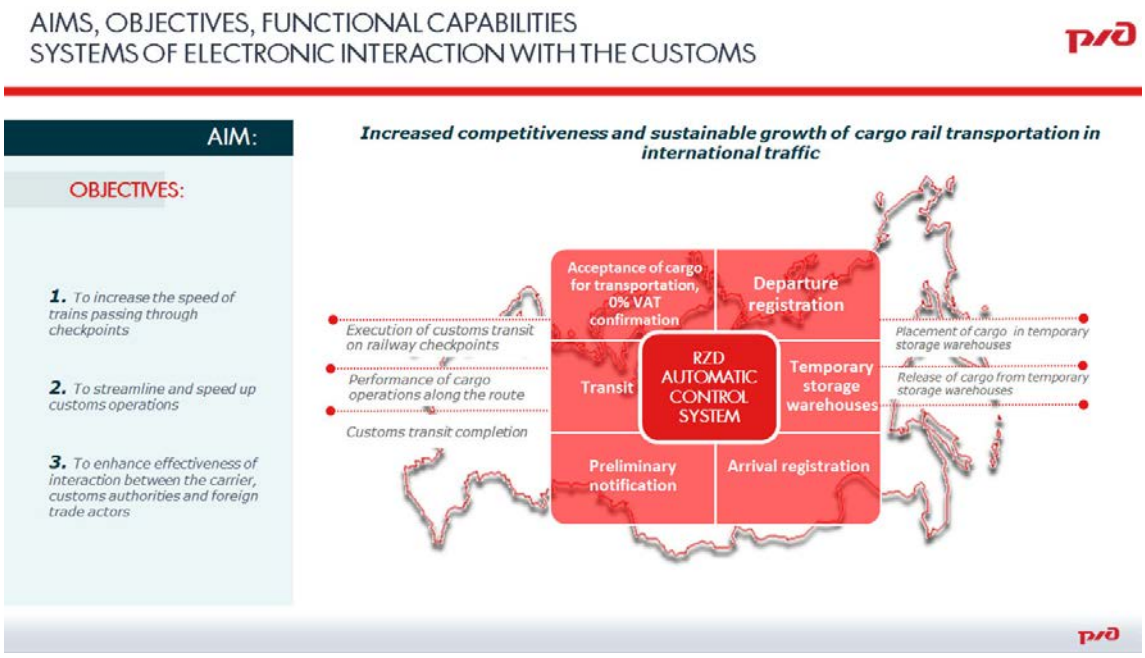


Figure 58. Objectives of electronic data interaction with customs and methods to achieve them (Source: Yakovleva, 2017).

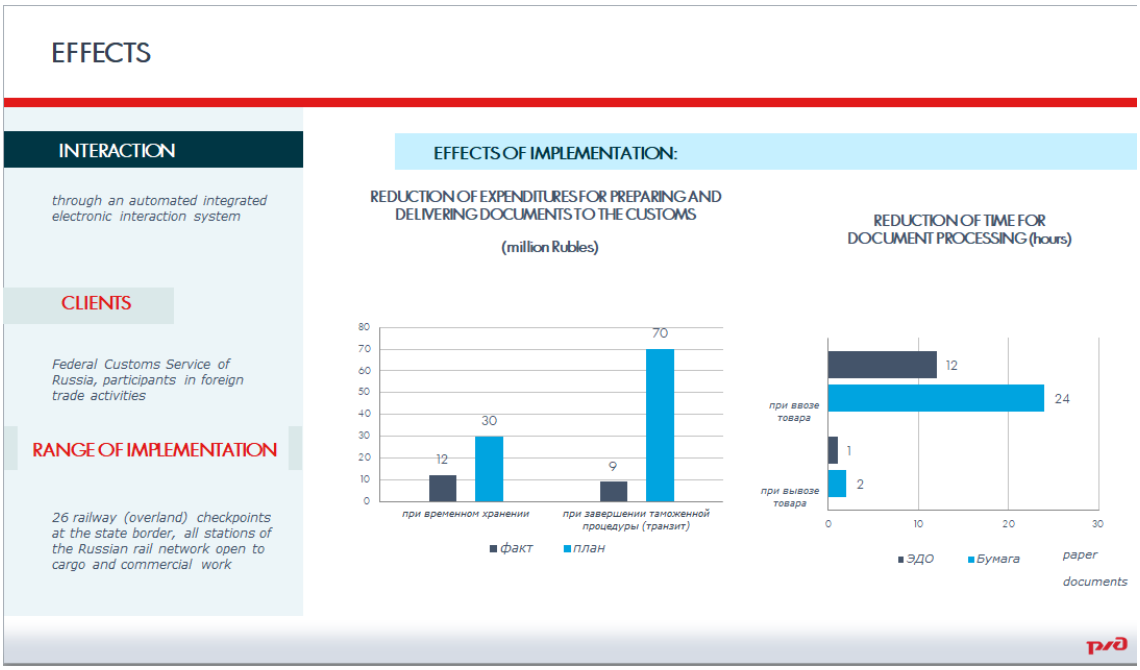


Figure 59. Effect of the implementation of electronic data exchange for international rail transport (Source: Yakovleva, 2017).

4.2.5 THE CASE STUDY OF UN CEFACT[33]

The UN Centre for Trade Facilitation and E-business (UN CEFACT) aims to improve coordination and cooperation in the trade facilitation recommendations and electronic business standards, covering both commercial and government business processes that can foster growth in international trade and related services. As part of this work, they analyse procedures and transactions and promote the use of methods such as the single window for freight transport.

Any transaction entails a complex set of interactions and UN CEFACT has long established a set of standards for data and documents harmonization, which it periodically updates. Among those standards is the UN Layout Key for Trade and Transport, which was first published in 1973 and has become the *de facto* standard for most international trade and transport documents. For instance, it has provided the basis for International transport Conventions such the maritime bill of lading (ICS), air waybill (IATA), the CMR for road, and the CIM for rail. The UN Layout Key provides also the foundation of customs and other regulatory procedures. In fact, analysts note that there are many similarities between transport and customs documents. Thousands of document formats are based on UN Layout Key across trade, transport, finance, customs, insurance, inspection. The latest revision concerns electronic documents.

[33] This section is based on the contribution and presentation by Mr. Mario Apostolov, Regional Advisor Trade Division, UNECE, delivered on 23 November 2017 at the workshop on Railways, intermodal transport and the computerization of transport documents.

The UN Layout Key contains families of forms that are used as standards for international trade, among which those for transport documents and those for customs documents. Those families of forms are based on the UN Trade Data Element Directory, comprising a set of data elements intended to facilitate an open interchange of data in international trade.

At the basis of the standardisation and harmonisation work of the UN CEFACT is the Core Component Library, containing syntax-neutral and technology-independent building blocks that can be used for data modelling. Figure 60 shows the growth of the core component library across its releases.

All the analysis and harmonisation work that leads to those libraries and directories is necessary for the development of e-documents since data should be harmonised across systems. Particular care should also be devoted to semantics as different people or organisations may attach different meanings to the same or similar terms or data elements.

An application of the framework just described is the development of single windows for transport and customs. UNECE Recommendation 33, adopted in 2005, defines a Single Window: as “a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfil all import, export, and transit-related regulatory requirements”. “If information is electronic, then individual data elements should only be submitted once”. A single window may be built along the five evolutionary stages shown in Figure 61, although to obtain a single window as just defined, only stages 1 and 2 are necessary.

The development of a single window entails the analysis of interactions and documents among several parties, understanding stakeholders’ present requirements, as well as tackling issues related to legacy systems.

A single window pilot has been developed for the Port of Odessa, in Ukraine, with information collected from businesses and sent electronically to customs. The pilot was successful in optimising the performance of customs that moved from a paper-based to a paperless system.

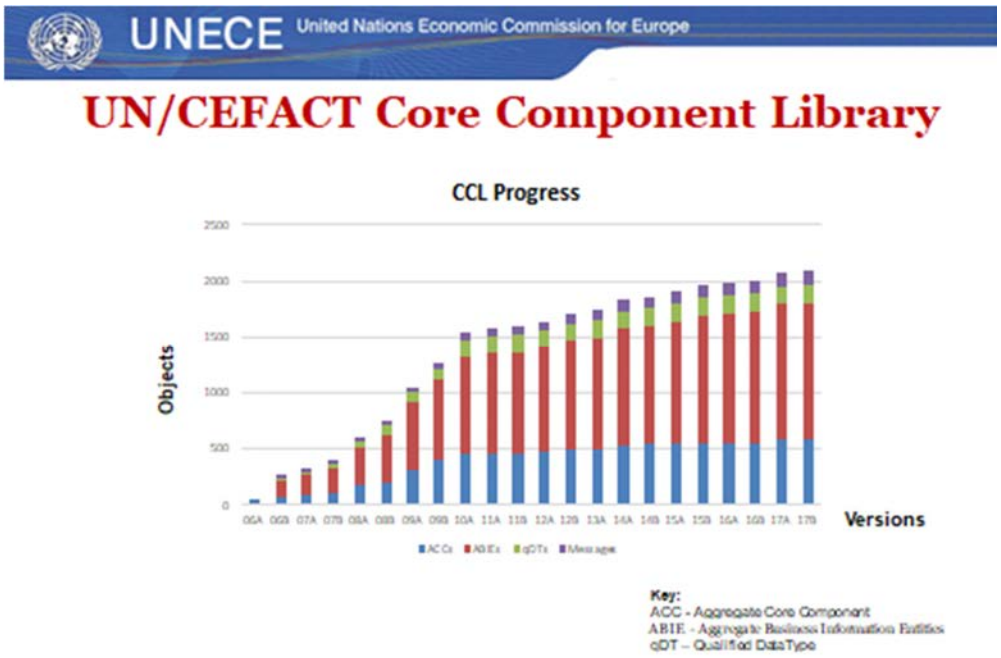


Figure 60. The growth in the number of objects included in the UN CEFACT core component library across the versions (Source: Apostolov, 2017).

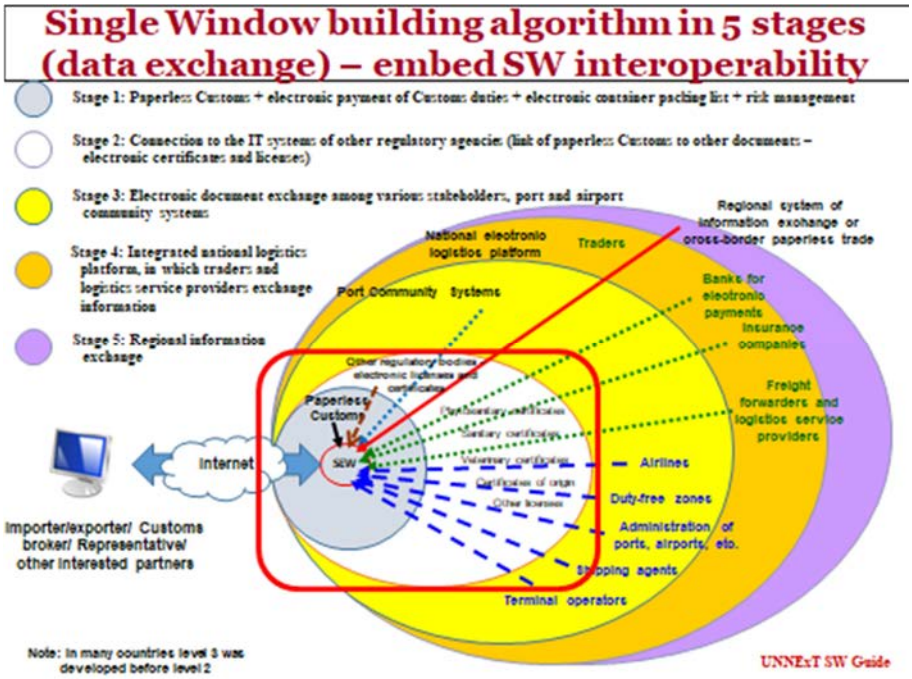


Figure 61. The five incremental stages for the development of a Single Window (Source: Apostolov, 2017).

5. Conclusions and recommendations

The proceedings of the workshop illustrated in the previous chapter and the evidence from the desktop reviews on the role of railways in intermodal transport and the electronic transport documents call for coordinated efforts towards the development of infrastructure, law and regulations, and data exchange systems that are as harmonised as possible and developed with a strategic and long lasting vision.

The drive to intermodal transport is warranted by trade facilitation and the need to reduce greenhouse gas (GHG) emissions. With transport sustainability as an objective, the principle should be that freight is transported as far as possible with rail/inland waterways/maritime and collected or distributed by road, with road legs that are as short as possible.

In terms of facilitating trade, international transport corridors are key for intermodal transport and are being further developed in terms of infrastructures, terminal facilities, and provision of capacity. However, their continuity is hampered by lack of capacity at borders associated in some cases to lengthy administrative procedures, as well as by different technical standards, not just gauge by also length and weight of trains, and power for traction. These result in available capacity in neighbouring networks left unused. Moreover, there is a lack of quality paths and freight trains are not given the priority they deserve in the daily management of traffic. Also, there is lack of coordination among maintenance schedules on corridors that brings about significant capacity reductions. The Rastatt incident has shown the need to have contingency plans based on robust risk management. For each main line, there must be pre-defined alternatives, to be elaborated and constantly updated together with railway undertakings and multimodal partners. More generally, regular coordination across public and private stakeholders involved is required.

Additionally, infrastructure managers should be incentivised so as to minimise the impacts of line closures and restrictions on rail services.

There is a need for better visibility of performance of corridors with Key Performance Indicators (KPIs) published so that shared goals are transparently pursued. Operators ask to have a significant role in decisions about EU freight corridors.

On a wider scale there a need to coordinate cross-border operations with a view that embraces the whole extension of Euro-Asian corridors, possibly with one coordination centre for each corridor. Coordination would assist in making the best use of capacity available so that the growth of Euro-Asian rail flows foreseen in the near future could actually be accommodated, and transports may be carried out with the quality of service required.

Terminals and in particular freight villages have a strong role in overall intermodal chains including railways and should be organised as nodes where syncromodal transports may change mode efficiently and value added services are available. Indeed, for Euro-Asian transport there is a need to provide efficient alternative routes also based on the storage and terminal capacity available. Freight villages function also as dry ports, inland terminals connected by rail to seaports, for the distribution and the collections of intermodal units that are transported by rail to the seaports. However, many terminals currently are below the required standards for efficient long distance transport such as allowed length and profile of trains, and are often located far from cities, thus lacking the connection to city logistics. Investments to overcome those issues are required.

In the EU the revision of the Directive 92/106 currently in force but seen as limited and outdated is ongoing. There has recently been a proposal for a new Directive (COM(2017) 648 final) and its quick finalisation would be useful to promote intermodal transport further. Operators express the need for the successful passage of the Europe on the Move package, revising the rules of road haulage with a view to effectively closing the regulatory disparities that favour road. Moreover, European operators look forwards to the successful amendment of the energy taxation Directive 2003/96 to implement the polluter pays principle.

Specifically, on the revision of the Directive 92/106 it is noteworthy to mention that the Directive currently in force and defining combined transport in Europe, is focused on international transport. It stipulates how to prove that a transport operation is within the scope of the Directive, makes combined transport exempt from quota and restrictions, and subject to reduced national taxation. The new Directive would include a better definition of combined transport, extending it to national transport operations and provide for support to the development of transhipment terminals, consistently with the need mentioned above, with the aim to obtain an even availability of such facilities across the EU.

More generally, economic incentives to support intermodal transport and facilities should be clearer and sustained, coherently with principles defined at the outset of their launch. This is part of what has enabled the strong growth of intermodal rail transport in Switzerland, whereas incentives elsewhere are not certain.

Remarkably, the proposal for the new Directive, when updating the means to prove that a transport is within its scope, indicates explicitly the use of electronic documents and in particular mentions the e-CMR.

Paperless documents are feasible and have a large number of advantages in terms of time, costs, data quality and traceability, so much so that they may be positively seen as enabler of swift intermodal and international transport. As electronic documents entail thinking in terms of pieces of data rather than of actual documents, and since they are not constrained by the size of the forms on paper, they may facilitate the development of intermodal transport documents that account for the specificities of each mode.

There is a number of issues that are known since the outset of the development of e-documents and concern data integrity and security. Additionally, there are issue with sharing data among public and private actors, challenges due to several standards, limits due to the acceptance by banks and insurance companies, or in court proceedings, as well as challenges due to national laws, for instance explicitly mentioning paper documents or not allowing electronic signatures.

Efforts to establish the regular use of e-transport documents should continue and be strengthened. Indeed, Operators already implement paperless solutions for their own administration and operations so, to an extent, the establishment of e-document is lagging behind.

The current implementations of e-CIM or tests of e-CMR and e-TIR should demonstrate the viability and advantages of e-transport documents establishing ways to overcome issues. However, ultimately the equivalence of paper and electronic transport documents should be established effectively by governments with a view to switching to paperless transport, so that acceptance and use may increase. This requires, for instance, that more countries accede to e-TIR or e-CMR and foster their operation. Clarity on the issue of e-CMR data sharing with public authorities is needed, too.

The infrastructure for e-CIM is in place and work for the development of an e-CIM/SMGS is ongoing with a view to have the system available in 2019. However, e-CIM is not yet used for intermodal trains: tests and regular operations should be set up. To make the most of the possibility to carry out Euro-Asian transport with e-CIM/SMGS levels of IT used in intermodal transport in different countries should be harmonised, and consensus to switch to paperless transport should be reached across interested parties. Moreover, each country has its own developing electronic workflow system and programs aimed at improvement of execution and approval processes of the documents. A well-established system of interaction between all participants in the transportation process is needed.

6. REFERENCES

CCTT (2017). Coordinating Council on Trans-Siberian Transportation. Available at http://en.icctt.com/international-importance. Last accessed in November 2017

CIS (2014). CESAR brochure. Available at www.cesar-online.com/downloads/brochure/customer_brochure_en.pdf

CIS (2017). CESAR website. Available at www.cesar-online.com/index.htm. Last accessed December 2017

Comité de Ministres Benelux (2017). Décision du Comité de Ministres Benelux relative à un projet pilote intra-Benelux portant sur la lettre de voiture électronique

Croci A. (2015) EDI services: Electronic Data Interchange Services — EDIGES → EDI Goal (with) External Systems. Presentation to the UIRR ICT Interest Group delivered on 29 April 2015

DG MOVE (2011). Handbook on the Regulation concerning a European rail network for competitive freight. Commission Staff Working Document https://ec.europa.eu/transport/sites/transport/files/modes/rail/infrastructures/doc/erncf_handbook_final_2011_06_30.pdf

DTLF (2016a). Meeting minutes. 16 March 2016.

DTLF (2016b). Meeting minutes. 20 December 2016.

EC (2017). Register of Commission expert groups. Digital Transport and Logistics Forum. Accessible at: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3280

ERFA, NEE and UIRR (2017). Learnings from Rastatt: Infrastructure Managers must strengthen their support for international services. Available at www.uirr.com/en/media-centre/press-releases-and-position-papers/2017/mediacentre/908-erfa-nee-uirr-press-release-learnings-from-rastatt.html

Evtimov E. (2010). Promoting the harmonization of railway legal regimes and documentation, including the use of the common CIM/SMGS consignment note. Presentation at the 18th OSCE Economic and Environmental Forum. 16 March 2010

EY (2016) Economic footprint of the Channel Tunnel fixed link. Available at www.ey.com/Publication/vwLUAssets/Economic_footprint_of_the_Channel_Tunnel_fixed_link/$File/Channel%20Tunnel%20EN%20light.pdf

Ferreiro J. (2013). International TIR Data Bank Web Service (ITDBWS). Presentation delivered at UNECE GE.1 – twenty-second session, Geneva, 30-31 May 2013

Feyen E. (2017) Digitalisation in road-rail combined transport. Presentation delivered at IRFC 2017 International Rail Forum & Conference, Prague, 22 March 2017

FOT (2016a). Swiss transport policy. Leaflet. Available at www.bav.admin.ch/bav/en/home/topics/alphabetical-list-of-topics/neat.html

FOT (2016b). The New Rail Link through the Alps (NRLA). Leaflet. Available at www.bav.admin.ch/bav/en/home/topics/alphabetical-list-of-topics/neat.html

Galushko D. (2016). Study on corridors. OTIF

Getlink (2017) website of the Getlink group. Availbale at www.getlinkgroup.com/uk/group/operations/traffic-figures/. Last accessed December 2017

HUPAC (2017). HUPAC website. Availbale at http://www.hupac.ch/. Last accessed December 2017

IRU (2012). Implement TIR-EPD green lanes. Leaflet

IRU (2017a). Computerised TIR data exchange between customs, IRU and Associations. Version 3. 20 January 2017

IRU (2017b). First ever border crossing to use e-CMR electronic consignment note. Press release issued on 19 January 2017. Available at www.iru.org/resources/newsroom/first-ever-border-crossing-use-e-cmr-electronic-consignment-note

Islam D.M.Z., Zunder T.H., Jackson R., Nesterova N., Burgess A. (2013). The potential of alternative rail freight transport corridors between Central Europe and China. Transport Problems 8 (4)

Kern (2017). e-CMR: Digitalising consignment notes. Presentation delivered at Smart Mobility World. 10 October 2017, Turin, Italy.

Marinova V., Abe M., Hügel J. and Sceia A. (2016). eTIR: Towards Paperless Cross-border Trade. IRU, UNECE, UNESCAP

Mayo J. (2017). The Economics and Regulation of the Freight Rail Industry. Introductory presentation delivered at the Third Annual Research Colloquium on the Economics and Regulation of the Freight Rail Industry on 16 June 2017. Available at http://cbpp.georgetown.edu/events/economics-and-regulation-freight-rail-industry-third-annual-research-colloquium

Raildata (2017a). ECN in production between DBCDE and CDC. Press release, 24/10/2017. Available at www.raildata.coop/node/378

Raildata (2017b). Raildata/Orfeus webpage Available at www.raildata.coop/ORFEUS.htm. Last accessed December 2017

Roland Berger (2017) Eurasian rail corridors: what opportunities for freight stakeholders? UIC

Seidelmann C. (2010). 40 years of Road-Rail Combined Transport in Europe. From piggyback traffic to the intermodal transport system. International Union of combined Road-Rail transport companies UIRR scrl

Service public fédéral Mobilité et Transports (2017). Lettre de voiture électronique. Web page accessible at https://mobilit.belgium.be/fr/circulationroutiere/transport_marchandises_et_voyageurs/marchandises_compte_de_tiers/acces_au_5. Last accessed: December 2017

Suivi de Zurich – Working Group (2014). Heavy Goods Traffic Management Systems in the Alpine Area. Review on Combined Transport in Alpine countries

Troche G. (2015) EU rail Freight Corridors for seamless rail freight services across Europe. Presentation at the SUSTRAIL final conference. Available at www.sustrail.eu/IMG/pdf/002_ec-troche_-_rail_freight_corridors_-_sustrail_final_conference_brx_21-05-2015.pdf

UIC (2014). Requirements of Railway Undertakings for the Implementation of European Rail Freight Corridors

UIC (2017a). 2016 Report on Combined Transport in Europe. Available at https://uic.org/IMG/pdf/2016_report_on_combined_transport_in_europe_cles.pdf

UIC (2017b). UIC e-rail freight intermodal webpage. Available at https://uic.org/erail-freight-intermodal. Last accessed December 2017

UNECE (2001). Terminology on Combined Transport. Available at http://www.unece.org/index.php?id=26168

UNECE (2015a) UNECE and IRU sign MoU on the computerization of the TIR procedure (eTIR). Available at www.unece.org/?id=39319

UNECE (2015b). UNECE welcomes extension of the guaranteeing agreement between the Federal Customs Service of the Russian Federation and the Association of International Road Carriers. Press release. Available at www.unece.org/?id=38833

UNECE (2015c). Georgia and Turkey kick-start eTIR pilot project. Available at www.unece.org/index.php?id=39116

UNECE (2016). Georgia and Turkey create digital link with eTIR, 29 January 2016. Available at www.unece.org/info/media/news/transport/2016/georgiaand-turkey-create-digital-link-with-etir/doc.html

UNECE (2017a). Computerization of the TIR customs transit procedure to enhance efficiency and transparency of global transport of goods. Press release, 6 October 2017. Available at www.unece.org/?id=47070

UNECE (2017b). International TIR Data Bank web page. Available at https://itdb.unece.org/public/about. Last accessed in November 2017

UNNExT (2014). Towards an Enabling Paperless Trade and Transport Environment: Towards Electronic TIR Customs Transit System (eTIR), Brief No. 12, September 2014. Available at http://unnext.unescap.org/pub/brief12.pdf.

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