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Item 12 of the provisional agenda

Positioning of Railways in global transport arena

Note by the secretariat

Historical review of Railways evolution¹

1. Railways and their roots present a varied picture around the world. In Europe and Asia they are generally owned and run by the state. In the United States, by contrast, the railroads are largely in private ownership. But this hasn't always been the case. Indeed, the construction of railways in Europe in the nineteenth and early twentieth century was mainly carried out by the private sector. It was only later the governments increased their control of the rail sector.

2. With road infrastructure still in an early stage of development, countries soon realized that rail networks were of critical importance to the economy. Governments also came to feel that it was their duty to ensure a functioning railway system operated in the public interest. European countries began to restrict commercialization and limit competition. This step led to loss of traffic and a noticeable deterioration in the financial position of railways. Private railways were no longer willing to invest in infrastructure and rolling stock. By 1950 nearly all the railways in Europe were state-owned and the vast majority of them still are.

3. The picture in the United States is very different. As early as the nineteenth century, American railroad companies were listed on the stock exchange. By 1970 all intercity railroad services – both passenger and freight – were privately owned but regulated by the government. However, passenger traffic was in decline and return on investment insufficient to maintain the track. The US Congress decided to establish a new, more balanced regulatory system that allowed railroads to act freely in terms of managing their own assets and setting prices for their services. The state-owned company Amtrak was founded to relieve freight railroads of most of their unprofitable passenger operations.

4. The dissolution of the USSR and of Yugoslavia and Czechoslovakia led to the emergence of more than twenty new national railway companies. Some of these networks –

¹ Martin Streichfuss, Partner of Roland Berger, Article on “Railway Transformation” book of Roland Berger Strategy Consultants.

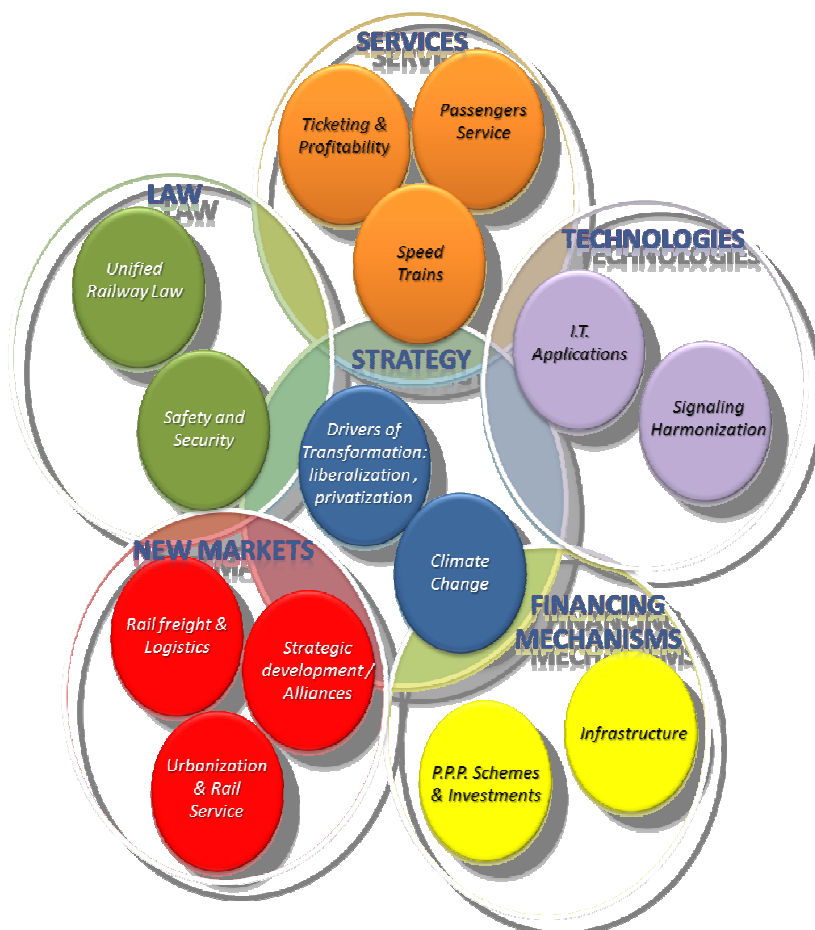
the national railways of Russia Federation, Kazakhstan and Ukraine for instance – are among the largest in the world.

The challenges that railways will face in the next decade²

5. The following figure (figure 1) summarizes the challenges that railways face today.

Figure 1

The challenges of Railways for the next decade in the UNECE region



Source: UNECE Transport Division

Strategy - Policies

The drivers of Railways Transformation.

6. **Liberalization.** One of the main drivers of railway transformation is liberalization. Governments have a number of different aims in pursuing this policy. They include encouraging innovation and quality by introducing competition, stimulating investment to

² Martin Streichfuss, Partner of Roland Berger, Article on “Railway Transformation” book of Roland Berger Strategy Consultants.

create or safeguard employment, increasing efficiency and relieving the burden on the state in terms of financial support. Liberalization has a firm place on the discussion agenda in most countries with developed railway markets.

7. Three basic models of liberalization can be observed. In North and South America, most private railway companies vertically integrate their rail freight and passenger operations with infrastructure management. Strong demand on dedicated routes justify railroads offering parallel own networks, competing against each other. The infrastructure itself is either owned by the railway company, as in the United States, or run as a concession, as in Latin America.

8. A second model is found in Japan. Here privatization occurred in the early 1990s. However, no broad liberalization occurred on the markets. Today passenger rail business is provided by vertically integrated companies with a regional focus. The state-owned rail freight operator has access to the tracks owned by passenger railway companies. Private players face a major barrier to entry as they can only enter the market by offering their own infrastructure.

9. EU member states presents a third model. Vertically integrated incumbent railway companies run their passenger and freight operations separately from infrastructure management. At the same time, a regulator oversees access to the track. The result is that intramodal competition in the market is found in the rail freight business, with competition for the markets in the passenger sector limited to public tenders.

10. The European Union has approved a number of railway packages. The following figure details the contents of these packages and outlines their main objectives.

Figure 2

European Union railway policy

<i>1st Railway Package</i>	<i>2nd Railway Package</i>	<i>3rd Railway Package</i>	<i>Main Objectives</i>
All rail freight co's can access Trans-European rail freight network (TERFN)	Cabotage in freight transportation	Common approach to training drivers	Increase modal share of rail to reduce <ul style="list-style-type: none"> • CO₂ emissions • Road congestion
Infrastructure separate from transport business	Harmonization of security standards	Codification of passengers rights	Stimulate competition and so raise efficiency and quality in the industry
Track access charges based on marginal costs	Market access improved through interoperability	Open access for all international services possibly including cabotage	Reduce government funding in the industry
Independent regulator	Coordination and harmonization by European rail agency	Quality standards for rail freight sector	
EU-wide licenses			

Source: European Union

11. **Privatization.** Another driver for the liberalization of railways is the ultimate goal of privatization. The transformation from public to private ownership is a complex task for governments. The first step in the process involves the formal conversion from a public to a

private legal form. This is followed by functional privatization, involving the transfer of sovereign duties to the new private company or companies.

12. Privatization in Europe presents a complex picture (figure 3). Only Great Britain has completely privatized its railways. The former national incumbent British Rail was broken up into more than 100 separate train operating companies among them six freight companies. Following their sale to the US company American Wisconsin Central Railroad, five of these six freight companies were amalgamated to form English, Welsh and Scottish Railways (EWS). EWS was sold to Deutsche Bahn in 2007. The company remains to this day the UK's leading rail freight provider. In 2002 the infrastructure management company Rail track was brought back under public control and renamed Network Rail.

Figure 3

Railway privatization in Europe

<i>Country</i>	<i>Passenger Rail</i>	<i>Rail Freight</i>	<i>Infrastructure</i>	<i>Comment</i>
Denmark	X	✓	X	Rail freight sold to Deutsche Bahn
Estonia	(X)	(X)	(X)	66% of integrated railway operators sold; re-nationalization followed reduction of track access charges which made operator's business unviable
Germany	(✓)	(✓)	X	IPO planned but was postponed
Great Britain	✓	✓	(X)	British rail split into 100 companies; infrastructure re-nationalized after several major accidents caused by infrastructure failure
Hungary	X	✓	X	Rail freight sold to Rail Cargo Austria
Netherlands	X	✓	X	Rail Freight sold to Deutsche Bahn

✓ Prioritized, (✓) Partially / soon to be privatized, X Not privatized, (X) Privatized then re-nationalised

Source: Railway Transformation

13. The pattern is different in other European Union member states. In the Netherlands, Denmark and Hungary, rail freight operations were sold to incumbent railway companies from other countries.

Climate Change

14. In environmental terms, any modal shift towards rail travel will reduce CO₂ emissions and thus contribute to meet CO₂ emission reduction target. French statistics, for example, show that on a 500 km trip, high speed trains generate 7 g of CO₂ per passenger per kilometre, while busses produce 17g of CO₂ pkm, individual cars produce 47g CO₂ per pkm and planes produce 66 g CO₂ per pkm. Taking the train –London Paris – instead of a

flight leads to a 90% reduction in CO₂ emissions (return trip by plane 140.6kg/CO₂, 8.2kg/CO₂ by train per passenger).

15. *“Railways have an extremely long life time and are constructed to withstand natural hazards, such as i.e. the 100 year flood. However, as the number and the intensity of incidents caused by extreme weather events will arise in the future, the pressure on the capacity of the rail system will rise together with the costs for the sector. Adapting to the growing risks that the increasingly higher frequency of extreme weather events (with increasing higher intensity) is a newer challenge for society and for the rail sector. While we have an understanding of the causes of climate change, the consequences will advance quickly and are hard to predict.”*³

16. Mitigation and adaptation are two big challenges for railways for the coming years. Mitigation is an advantage that railways should take advantage and boost their market share. Adaptation is a need as to avoid future disasters due to climate change. But do the railways in UNECE region have a strategy for the next decade regarding climate change mitigation and adaptation?

Services

Speed Trains⁴

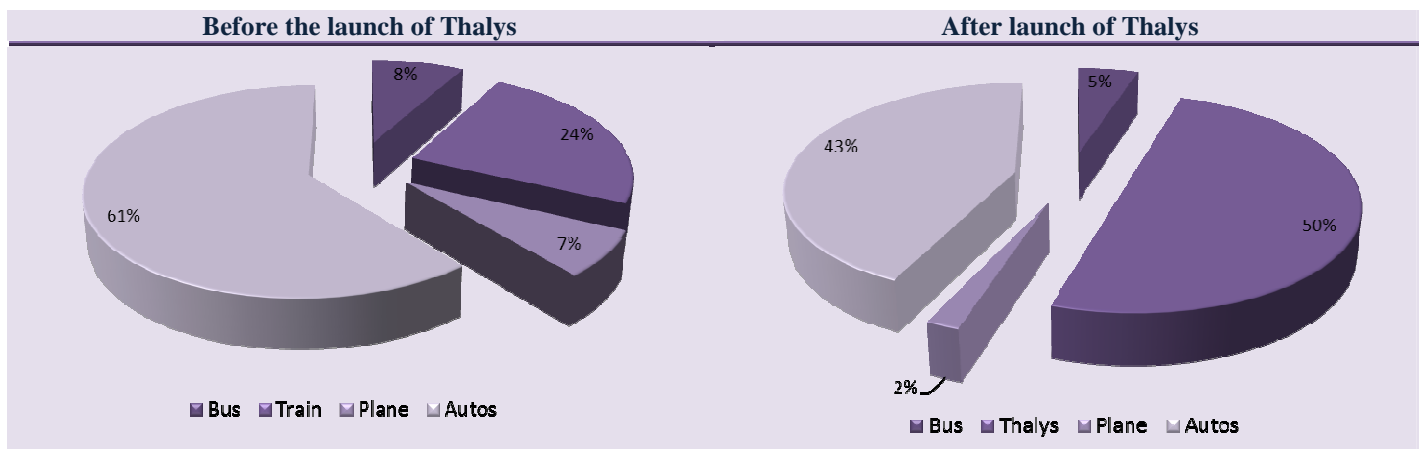
17. The creation of high speed networks coincides with the revitalisation of rail during the past two decades. It is, in fact, an essential part of it. Wherever high speed and very high speed lines have been built, they have proven an enormous success for passenger transport. These networks have met customer demand and passenger numbers have frequently grown in double-digit percentages in those Member States that have created these lines. The first high speed line between Paris and Lyon was primarily created to resolve capacity problems. Since then, it has become evident that time is a major competitive factor for rail. It is essentially high speed lines that contribute to the growth of modal share for rail in passenger transport. This growth is partially also due to the European rail supply industry that has taken over product development and is now able to provide a range of different models of very high speed trains.

18. What are the benefits of high speed trains? There is the obvious benefit to the passenger. It is now possible to travel from Paris to Brussels in 1h30, from Madrid to Barcelona in 2h38 or from Rome to Naples in 1h27. The passenger can get on and off the train in the city centres. No more lengthy travel to and from airports or check in times are needed. In terms of modal shift from air to rail, the effect has been evident. On all these lines, the demand for rail transport has multiplied resulting in a greater market share of rail. The Thalys line between Paris and Brussels is a prime example in this respect. The following figure shows that the modal share of trains after the opening of this line has doubled.

³ www.uic.org

⁴ Michael Clausecker, Director General UNIFE, Nike Bonnen, UNIFE Public Affairs Manager, Article on “Railway Transformation” book of Roland Berger Strategy Consultants.

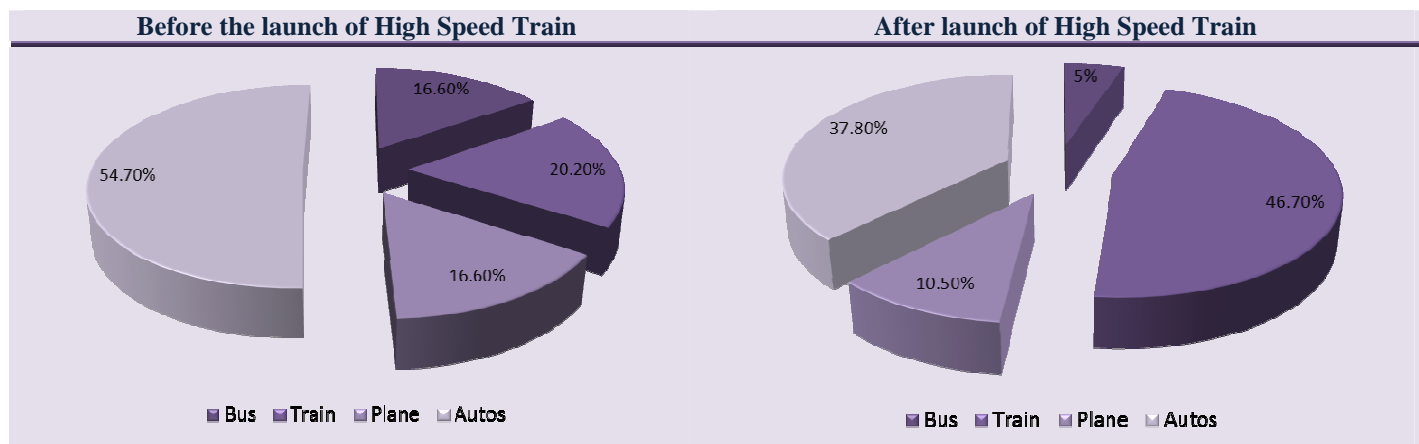
Figure 4
Modal share of trains before and after launch of high speed rail – example Paris - Brussels



Source: UIC 2005

19. Similar results are expected for the newly opened high speed line between Madrid and Barcelona which has once been one of the busiest air connections of the world.

Figure 5
Modal share of trains before and after launch of high speed rail – example Madrid - Barcelona



Source: ADIF 2009

20. Speed trains appear to be the new niche market for railways. The new source for increasing revenues. But which are the current developments regarding speed train in UNECE region? Are there any criteria for route selection and which are they? Are the speed trains the real competitor of cars? Is there any need to create best practices for this market?

Ticketing and Profitability⁵

21. Revenue management does not generate demand; it merely enables it to be matched better to supply. Fare structure affects demand levels much more fundamentally than revenue management. So far, fare segmentation has aimed at having the right fare for each customer segment, while finding the right course between two stumbling blocks:

(a) The more precise the segmentation (to match demand better), the less precise the demand forecast underlying the revenue will be.

(b) The more precise the segmentation, the harder it is for the customer to understand, as he also wants highly transparent offers.

22. The value of the revenue management system does not lie in the optimization software, but in the detailed knowledge the operator has of its competitive environment, of how consumers are behaving and of the characteristics of the catchment area specific to each market that allows it to adjust yield on a day to day basis.

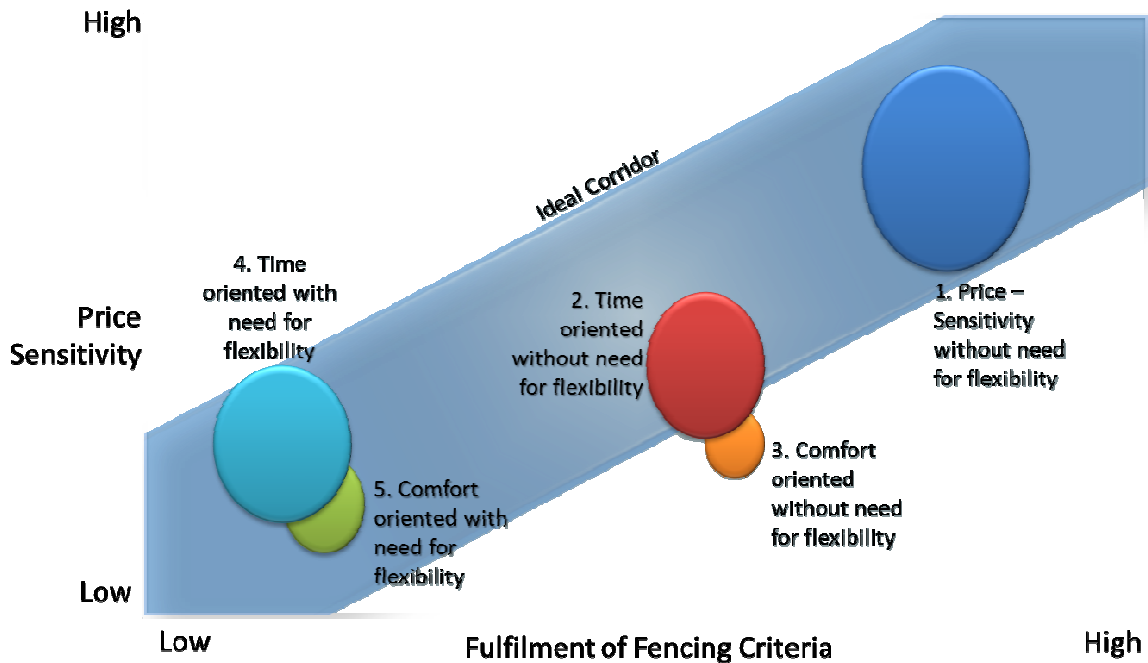
23. The yield models used today work well in stable markets like Paris – London and if the operator is the leader in its market. If an operator is the leader in its market, in fact, it sets the prices in that market. If it is a “challenger”, it has to adopt a much more reactive and tactical revenue management, and use dynamic pricing to position or reposition its prices in response to the leading operator’s price.

24. When the concept of revenue management was developed at Deutsche Bahn in the late 1990s, the investigation of customer preferences and travel characteristics was an important first step. The main question to be answered was whether customers would accept the principle of booking tickets for a particular train in advance and to what extent. In such a system, all customers need to book a specific train. Most European and all German train travellers were still used to buying a ticket (for a certain route) that was valid on all trains in a certain period.

25. The following figure shows the results of a market survey that analysed customer preferences regarding price, time, comfort, and flexibility, but display high price sensitivity. These customers (group 1) accept fencing criteria for the tickets, such as booking a specific train several days in advance and week end stay rules. For this customer group, revenue management can be applied. On the other hand, the many customers in segments 4 and 5 have a need for flexibility and are not price sensitive. Re-educating these customers to use a closed system would be rather difficult.

⁵ Maria Harti, CEO of Idtgv, Hans Joachim Luhm, Head of pricing at DB Fernverkehr AG, Andreas SchwilligPartner of Roland Berger, Article on “Railway Transformation” book of Roland Berger Strategy Consultants.

Figure 6
Customers Segmentation regarding ticketing



Source: Railway Transformation.

26. The questions that arise and therefore the challenges for the railways are:

- Do, railways need a partly open system?
- And if yes then do they need really a revenue management system?
- What is the best ticketing strategy and therefore revenue management for the member states of UNECE?

Passengers Services

27. The passengers will range from regular commuters to occasional travellers to single visit tourists. The passengers' ages will range from young children to elderly. Concession may be available to sub-groups within this population depending on the country, region, city or even individual transport operator's policies.

28. The current trends in air travel, rental cars and company cars are good news for railways. The rail companies have a golden opportunity to reposition themselves in the premium segment. Rail travel is widely perceived as being better for the environment. Stricter company travel policies mean less money spent on all forms of travel – and railways are suffering also from the “travel less and, if so, travel cheaper” rule. But it also means that many top executives are switching to rail – and will stay there, if they are pleasantly surprised with what they find.

29. Good service, fast, punctual connections, exclusivity – these are things that people who are used to paying for business class flights do not mind paying a premium for (compared to second class tickets). But railways still lag behind the airlines and automotive industry here, despite their protracted efforts to appeal to the “vanity” of the premium segment.

30. Passenger services and different service packages provided by the railway companies constitute their competitive advantage. In the same time experience sharing and identification of best practices is always a need. Do the member states of UNECE use the same practices regarding passenger services? Is there any need for experience sharing?

Law

Unified Railway Law⁶

31. Development of an adequate transport system is a prerequisite for a country's economic progress. Transport is particularly essential for the development of international trade. In order to provide for efficient and seamless international transport, common conditions governing international transport have been developed during the last 50 years and are now applicable at regional and global levels for all modes of transport, except for rail transport.

32. Over the past decades, international trade, particularly between Europe and Asia, has exploded. So has containerized maritime transport reaching over 10 million twenty-foot equivalent units (TEU) annually. This trend is predicted to continue, while seaports on both continents are already close to saturation. The same holds true for port hinterland transport in Europe and Asia.

33. At the same time, important infrastructure projects along Euro-Asian transport corridors have already been completed or are close to completion, such as new railway lines and border crossings between China, Kazakhstan and Mongolia, the Marmaray tunnel under the Bosphorus in Turkey and the rail link between Iran (Islamic Republic of) and Pakistan connecting the Indian sub-continent with Europe.

34. Building adequate infrastructure is, however, not sufficient to exploit the potential of long-distance rail freight transport along the Euro-Asian land bridge as well as between adjacent countries. A level playing field is required in among competing modes. Also required are transparent and harmonized provisions of transport law applicable in the same way in all countries along Euro-Asian rail transport corridors that do also away with complicated border crossing procedures.

35. Only then will railways be able to create a solid market niche for time-sensitive cargoes between the markets for air (1 day) and maritime transport (30 days). Numerous test runs have already been organized that show that rail could indeed provide a possible option for Euro-Asian freight transport, being twice as fast as maritime transport and considerably cheaper than air freight.

36. It is against this background that UNECE Governments are now developing a strategy or road (rather) rail map to do away with the disadvantages railways are suffering from the lack of a unique railway law for the international transport of goods. Globalization, privatization and deregulation provide the railways with new options of action. Railway markets reach now out to transcontinental and global traffic flows. Governments should take up this challenge and act swiftly at the international level to turn rail market opportunities along Euro-Asian transport corridors into rail business.

⁶ Towards unified railway law in the pan-European region and on Euro-Asian transport corridors/ Position paper by the Working Party on Rail Transport, Geneva, 1–3 March 2011.

Safety and Security

37. *“During a late July lightning storm, two of China’s bullet trains collided in the eastern city of Wenzhou, killing 40 people and injuring nearly 200 in one of the world’s worst high speed passenger rail accidents. China’s government initially blamed flawed signalling and human error. It recently postponed public release of its crash findings. The precise cause of the disaster remains uncertain, so there is no way to know what role, if any, the signalling assembly may have played”.*⁷

38. *“.....a passenger train, the Regional Express (TER), was blocked violently, at the risk of causing a serious accident. Huge quantities of objects had been thrown onto the rails in the Nord districts of Marseille, by "a group of about twenty young people" said AFP (Agence France Presse). According to the Télégramme, the locomotive was damaged when it brutally struck a shopping cart. A freight train that was following behind was in turn blocked by the TER but fortunately did not hit it. The "young people" could not get into the TER, but the freight train became the scene of a veritable razzia”.*⁸

39. *“....Since Monday, police and train officials have discovered 17 incendiary devices planted next to train tracks and near signalling equipment in Berlin and in the surrounding area. Two of them have gone off. Though no injuries have yet been reported, the discoveries have resulted in significant train delays and several cancellations”.*⁹

40. Safeguarding passengers and assets is of paramount importance to all public transport stakeholders and many topics and questions are constantly presented to the industry on these matters. Apart from the devastating consequences that can arise from security breaches; delay, disruption and the perception of unsafe networks cause flight from rail and public transport networks and consequently have a negative impact on the end result. Security and safety issues are increasingly important to all transport operators and of course railways.¹⁰

New Markets

Rail Freight and Logistics

41. The European railway industry is driven by three key competitive factors:

- Market consolidation. This has slow down as result of the economic crisis, but is still very strong. The end effect will be three to five European or regional leaders, each with a comprehensive networks,
- Liberalization, on average, around 20% new private players have emerged in European countries as a result of liberalization,
- The fight for survival. Many national railways are at risk of collapsing.

42. The need for railways to provide one stop shop intermodal and logistics solutions – services is required more now than ever. There are many examples where the revenues from the added value services – warehousing, distribution, and logistics – are higher than the revenues from the rail business itself. It is very possible in the near future the rail

⁷ The Wall Street Journal, Tuesday, October 4 2011.

⁸ Novopress.info, 08/07/2011

⁹ Spiegel Magazine, 10/13/2011

¹⁰ European Railway Review, Issue 5 2011

services to constitute the cause but not the main source of rail organizations revenues and profits.

43. Green logistics and the need to reduce CO₂ emissions should also be a key driver for the rail freight market. Internationally active companies, in particular, are increasingly aware of their ecological responsibility and on the lookout for ways to optimize their transport mix from an environmental point of view.

44. According to the type of rail freight products, the degree in competition, intensity of internationalisation as well as market developments differ. Block train is the domain of new entrants, in particular in the fields of chemistry and automotive due to wagon availability on the market. Intermodal is a growth segment with fragmentation of the value chains and direct investment into terminals and wagons. Single Wagon Load (SWL) tends to decrease; SWL barely attracts competitors. However, if rail wants to compete with other modes of transport and regain its market share, it has to rely on the flexibility of the SWL network.

45. What are the implications for the UNECE region?

- The product – services mix that the European rail organizations offer is the same with this of Central Asia or Caucasus rail organizations?
- Which is the business environment for railways in CIS and Caucasus countries?

Urbanization and Rail Services

46. According to The State of World Population 2001, an actual report from the United Nations Population Fund, roughly 2.8 billion people live already in cities and by 2015 that number will have risen to 3.9 billion. The total population is increasing by 280.000 people per day. Nearly three-quarters of them will be inhabitants of the developing world. While in developed countries urbanisation has mainly taken place in the second half of the 19th century, developing countries are in the middle of their urban growth now. In Europe already 76 % of the population live in cities. Urbanisation has come to stand still and we can notice a process of dis-urbanisation and sub-urbanisation caused by a high rate of motorisation combined with prosperity and the development of traffic and communication infrastructure.

47. The number of mega cities, which have 10 million or more residents, is increasing worldwide: 1950: 4, 1980: 28, 2002: 39, 2015: 59. Two third of them are situated in developing countries, especially in South-East-Asia. In 2002 already 394 million people live in megacities, 246 million of them in developing countries, more than 215 million in Asia. In the year 2015 the total population of mega cities worldwide will be about 604 million and the further rate of growth will be high.

48. With view on megacities and agglomerations a regional settlement structure has to be designed which set up on the elements density, mixing of different land uses, polycentrality and capacity of public mass transport systems and public facilities. These are the prerequisites for achieving the ecological, social and economic targets of sustainability. The priority must be to slow down the urban growth. Therefore the living conditions and the economic basis in the rural areas must be strengthened, to prompt the inhabitants to stay there. Therefore it's a vital necessity to promote new forms of cooperation between cities and between the cities and the villages at the regional level.¹¹

¹¹ Prof. Dr.-Ing. Theo KÖTTER, University of Bonn, Germany, "Risks and Opportunities of Urbanisation and Megacities".

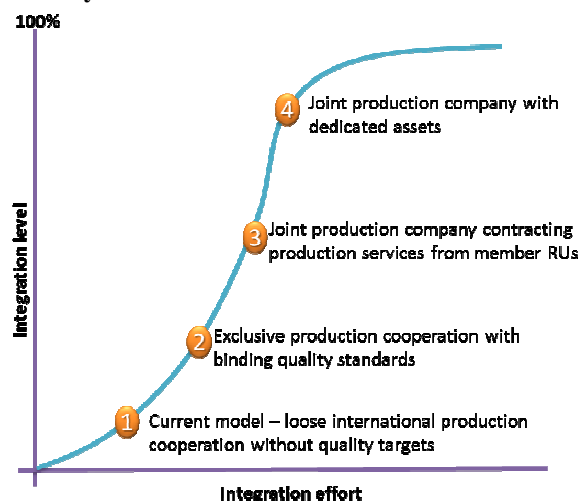
49. Railways have a significant role to play. This “role” needs strategy and share of best practices as the benefits for the railways to be the maximum one.

Strategic Development / Alliances¹²

50. Cooperation among the railways is possible with different focuses, i.e. production, administration, or sales and distribution. Whereas the freight rail market was clearly divided between the rail units for sales and distribution previous to market liberalization, the rail units offer their services via subsidiaries to customers all over Europe. International cooperation in sales is therefore decreasing across Europe and mostly limited to passenger traffic.

51. The figure 8 illustrates the typology of production cooperation models in the rail industry.

Figure 8
Typology of production cooperation models in the rail industry



Source: Railway Transformation

52. Cooperation models can be differentiated by integration level and integration effort and rank from a loose cooperation without fixed rules up to a joint production company with dedicated assets. All the models have their advantages and disadvantages and the suitable one cannot only be chosen based on economic reasons, but also has to take into account several factors such as company strategy, history and politics.

53. In Asia the cooperation models are different. State rail organizations cooperate on corridor basis and create rail services – normally block trains – along these corridors. Facilitation of time schedules and tariffs is the main negotiations part of their cooperation.

54. The questions that arise for the UNECE region are:

- What are the different cooperation models that exist today among the 56 member states?
- Are there any best practices? And if yes, these best practices can be applied to all the member states or there are certain obstacles?

¹² Oliver Sellnick, Freight and Passenger at UIC, Gunther Ferk, Project Leader XRAIL UIC, Article on “Railway Transformation” book of Roland Berger Strategy Consultants.

Financing Mechanisms

PPP. - PPC Schemes and Investments¹³

55. In 2010 the Infrastructure Extraordinary Plan (PEI) of the Ministry of public works of Spain began, with expected tenders in the region of €17,000 million – the equivalent to 1.7% of Spanish GDP - which meant a turning point in the model used up until then in Spain to construct and maintain new public infrastructures.

56. The PEI envisages the application of Public Private Collaboration (PPC) to promote cooperation between public administrations and the private sector for the development and modernization of infrastructures and public services of strategic interest.

57. The ADIF¹⁴ PPC presents a new formula as assets and debts in the part of deferred investments are shown on ADIF's balance sheet from the beginning. Similarly in PPC, the payment of part of the infrastructures is established upon completion of the work and set into service for a long period of time (from 20 to 25 years) – the specifications show that the deferred financing is guaranteed by ADIF so that financial entities qualify this debt as an ADIF corporation risk. The successful bidder only assumes maintenance services at the facilities with certain quality standards, which will mean a guarantee of optimal preservation of facilities which are constructed according to this procedure.

58. Within a PPC scope for new infrastructures executed by ADIF, for every contract, Specific Purpose Vehicles (SPV) shall be founded, with participation by ADIF and successful bidders in charge of executing the works. Similarly a negotiated procedure with competitive publicity / dialog will be followed according to applicable standards as specified in the following phases:

- Previous phase: selection of candidates who shall participate in the business phase between bidders, according to technical and financial solvency criteria. A maximum of five candidates will be chosen.
- Business phase: initial tenders shall be presented, which will be the object of negotiation of technical and economic aspects.
- Final phase: upon presentation of the final offer and depending on the specified characteristics in the negotiation / dialog phase, the contract will be awarded according to the criteria established in the specifications of the tender. SPV company capital will vary between 5% and 10% of the investment budget arising from the award of the contract. In these companies, ADIF participates with 10% of the capital.

59. Payments during contract execution will be as follows:

- During contract execution, payments per work amounting to 40% of the contract award price will be due – the remainder will be shown on ADIF'S balance sheet as a debt.
- This debt is cancelled by means of deferred payments per work, which amount to 60% of the execution price and are effective every half of the year upon setting into service the facility, plus the corresponding capitalised interests. This quantity will be

¹³ Article by Mr. Cristobal Perez Monjardin, Director of Financial Planning and Budget at ADIF at the European Railway Review Magazine, Issue 5, 2011.

¹⁴ Administrador de Infraestructuras Ferroviarias (Spanish Railways).

paid by ADIF, whichever problems arise with SPV or the facilities, according to a pre-established calendar.

- Finally payments for availability are effective, which are the only ones with an amount depending on maintenance quality services of the infrastructure in the operation phase.

60. Is the above mentioned case study a best practice or a common practice for Public Private Collaboration in UNECE region? Are there any best practices that State Rail Organizations should know as to follow?

Infrastructure¹⁵

61. Separation of infrastructure from operations makes it more difficult for railways to engage in effective differential pricing, partly because it is difficult for the infrastructure manager to identify what type of traffic is being carried on a particular train and there is therefore only limited scope to impose different infrastructure access charges for different markets.

62. On the other hand, the infrastructure manager's income from track access charges does not contribute significantly to infrastructure investment costs; in many countries track access charges do not even cover maintenance and operating costs. In these situations, the ability of rail infrastructure managers to finance investment themselves is reduced, leaving it to the state to take responsibility for funding most investment and also often some maintenance.

63. Public sector contributions for expenditure in rail infrastructure has been insufficient to allow infrastructure managers to meet maintenance and renewal costs and rail operators are not sufficiently compensated for public service obligations. As a result, especially in Central and Eastern Europe, the quality of the rail infrastructure network and rolling stock continues to deteriorate rapidly. This makes rail transport in Central and Eastern Europe less competitive, not only compared to other transport modes but also compared to rail in the rest of Europe.

64. Is therefore the split of operations from infrastructure a best practice that the railways in UNECE region should follow? Are there any other alternatives or best practices?

Technologies

Signalling Harmonization

65. Thalys train travelling from Paris to Cologne or Amsterdam needs to be equipped with **seven** different signalling systems in order to be able to cross **four** countries.

66. Apart from other technical differences the existence of more than 20 train control systems in Europe has always been a major obstacle to the development of international rail transport, as transport over long distances in Europe in many cases involves crossing national borders.

¹⁵ Johannes Ludewig Executive Director of CER, Jeremy Drew, Drew Management Consultants, Article on "Railway Transformation" book of Roland Berger Strategy Consultants.

67. The European Commission has issued several directives describing the technical and operational harmonization of the European Rail network with detail standards developed within this framework in the form of Technical Specifications for interoperability (TSIs). The control command system defined in these TSIs in order to ensure interoperability and to maintain the required level of safety is the European Rail Transport Management System (ERTMS). The development of the common European signalling system was started as early as the late 1980s. However, railway systems at national level renew their assets only very slowly, at around 3-5% per year – as not all the infrastructure, wayside and on board signalling equipment can be changed at once.

68. During the long transition period, interoperability is therefore also needed with legacy systems and various intermediate standardization steps. This complex patchwork of conflicting standards and requirements for signalling and information systems poses a major challenge for managing the introduction of ERTMS. The situation is further complicated by the fact that the track side part and the on board mobile part of the control command system fall under separate responsibilities between rail infrastructure management and train operators.

69. The following figure (figure 7) illustrates the national train control systems existing today in Europe. How many exist in UNECE region?

Figure 7
National train control systems in Europe



Source: Bombardier Inc.